STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY GRAY DAVIS, Governor
DEPARTMENT OF TRANSPORTATION
ESC/OE MS #43
1737 30TH. Street 2ND. Floor
SACRAMENTO, CA 945816

December 21, 1999

04-CC,Sol-80-22.0/22.7,0.0/1.8
04-013014

Addendum No. 5

Dear Contractor:

This addendum is being issued to the contract for construction on State highway in CONTRA COSTA AND SOLANO COUNTIES AT CROCKETT AND IN VALLEJO ON ROUTE 80 FROM 1.1 km SOUTH OF U.P.R.R. OVERCROSSING TO 0.4 km NORTH OF ROUTE 80/29 SEPARATION.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on January 11, 2000.

This addendum is being issued to revise the Project Plans, the Notice to Contractors and Special Provisions and the Proposal and Contract.

Project Plan Sheets 23, 57, 62, 63, 292, 314, 326, 328, 397, 399, 524, 690, 693, 694, 695, 696, 697, 698, 699, 700, 703, 705 are revised. Half-sized copies of the revised sheets are attached for substitution for the like-numbered sheets.

Project Plan Sheets 41C, 41D, 582A, 582B, 582C, 582D, 582E, 582F 582G, 582H, 582I, 582J, 582K, 582L 703A, 705A and 705B are added. A half-sized copies of the added sheets are attached for addition to the project plans.

On Project Plan Sheet 237, Quantities, the following items are revised as follows:

STRUCTURE EXCAVATION (TYPE A) (CLASS II)	M3	7875
FURNISH STEEL PIPE PILING (NPS 16)	M	5740
DRIVE STEEL PIPE PILE (NPS 16)	EA	160
3000 MM PERMANENT STEEL SHELL	M	502
3000 MM CAST-IN-DRILLED-HOLE CONCRETE PILING	M	1001
2700 MM CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	M	721

On Project Plan Sheet 237, Quantities, the following item is deleted:

STRUCTURE EXCAVATION (TYPE A)	M3	535

On Project Plan Sheet 238, "Pile Data-Cast-In-Steel-Shell Concrete Piles (NPS-30) (Type A) At South Anchorage" table, Control Location BB, under the Nominal Resistance, Compression and Tension are revised to NA, (Not Applicable).

On Project Plan Sheet 238, "Pile Data-Cast-In-Steel-Shell Concrete Piles (NPS-30) (Type A) At South Anchorage" table, Control Location BB, under the Design Tip Elevation, (1) and (2) are revised to NA, (Not Applicable).

On Project Plan Sheet 244, the following note is added under Notes:

"3. 152 mm diameter water line not shown."

On Project Plan Sheet 245, the following note is added under Notes:

"3. 152 mm diameter water line not shown."

On Project Plan Sheet 264, the following sentence is added to Note 6:

"The location of Crockett Viaduct girders shown is approximate."

On Project Plan Sheet 277, the following note is added under Notes:

"9. The weight of the tower footing forms at each tower is assumed to be 18,000 KN."

On Project Plan Sheet 450, Note 3 is revised as follows:

"3. The maximum actual pressure on bushing is 27 MPa."

On Project Plan Sheet 450, Note 5 is revised as follows:

"5. A compression force of 1980 KN shall be induced in each rocker link in such a manner that no bending moment will be imparted to the box girder under final dead load conditions including a provision for future dead load of 476 kg per meter."

On Project Plan Sheet 468, Note 4 is revised as follows:

"4. A compression force of 956 KN shall be induced in each rocker link in such a manner that no bending moment will be imparted to the box girder under final dead load conditions including a provision for future dead load of 476 kg per meter."

On Project Plan Sheet 525, on Cast-In-Drilled Hole Concrete Pile North Tower (T3) Elevation, the dimension shown for the reinforcement extension into the pile cap is revised from 3200 mm to 3700 mm.

On Project Plan Sheets 583 thru 689 in the lower title box, the Bridge No. 28-0302 is revised to Bridge No. 28-0352L.

On Project Plan Sheet 585, Project Note 53 is revised as follows:

"53 “53C, MT (for future use)”

On Project Plan Sheet 585, Project Note 57 is added as follows:

"57 41C, MT (for future use)"

On Project Plan Sheet 585, Project Note 57 thru 59 is revised as follows:

"58 and 59 Not Used"

On Project Plan Sheet 619, Project Note 53 is revised to Project Note 57. (Total 6 locations).

On Project Plan Sheet 711, Section S-S, use 5 mm weld size for both sides of the stiffener plate.

On Project Plan Sheet 712, Detail A, use 5 mm weld size.

On Project Plan Sheet 714, Section R-R, use 5 mm weld size for both sides of the stiffener plate.

In the "Important Special Notices", A + B Bidding Special Notice, the fifth paragraph is deleted.

In the Special Provisions, Section 3-101B, "Award and Execution of Contract,", the following paragraph is added after the third paragraph:

"The amounts of the two bonds specified in "Contract Bonds" of these special provisions shall be based on the "Total Bid (A)" set forth on the proposal form."

In the Special Provisions, Section 4, "Beginning of Work, Time of Completion and Liquidated Damages" the second paragraph is revised as follows:

"The work shall be completed in 2 phases. Phase I shall consist of completing work shown in Stages 1 through Stage 3 - Phase 2 and such other work, including the bridge barriers, the railing on the westerly barrier, all signs, lighting and electrical systems, traffic operations and call box systems, Bent 7 of the Crockett Viaduct, that will allow the New Carquinez Bridge to be completely open to traffic with a minimum of the three westerly traffic lanes and the westerly shoulder with their final striping configuration. After Phase I, no lane closures of the three westerly traffic lanes nor the westerly shoulder will be allowed. Phase II consists of all remaining work."

In the Special Provisions, Section 4, "Beginning of Work, Time of Completion and Liquidated Damages" third paragraph, the second sentence is deleted.

In the Special Provisions, Section 4, "Beginning of Work, Time of Completion and Liquidated Damages" the fifth paragraph is revised as follows:

"The Contractor shall pay to the State of California as liquidated damages the sum of $50,000 per day, for each and every calendar day's delay in finishing Phase I work in excess of the number of working days bid."

In the Special Provisions, Section 4, "Beginning of Work, Time of Completion and Liquidated Damages" the eleventh paragraph is revised as follows:

"A working day as defined in Section 8-1.06, "Time of Completion," of the Standard Specifications, is re-defined for this project. Paragraph 2 through paragraph 5, inclusive, of that Section 8-1.06 shall not apply. Saturdays, Sundays and legal holidays, including days of inclement weather, will be counted as working days."

In the Special Provisions, Section 5-1.12, "Out of State and Foreign Materials" is added as attached.

In the Special Provisions, Section 5-1.24, "Force Account Payment", is revised as attached.

In the Special Provisions, Section 5-1.25, "Overhead", is revised as attached.

In the Special Provisions, Section 5-1.37, "Relations With California State University Maritime Academy (CMA)", is revised as attached.

In the Special Provisions, Section 5-1.38, "Relations with Local Businesses", is revised as attached.

In the Special Provisions, Section 8-4, "Ultimate Splice Testing" is revised as attached.

In the Special Provisions, Section 10-1.01, "Order of Work", is revised as attached.

In the Special Provisions, Section 10-1.10, "Cooperation", is revised as attached.

In the Special Provisions, Section 10-1.11, "Progress Schedule (Critical Path)" subsection "Baseline Schedule" the following paragraph is added after the tenth paragraph:

"The number of calendar days for current contract completion in the Baseline Schedule shall be equal to the number of working days bid plus 200 working days. The Baseline Schedule shall include the completion of Phase I as one of the milestones."

In the Special Provisions, Section 10-1.11, "Progress Schedule (Critical Path)" subsection "Equipment and Software" the second paragraph is revised as follows:

"For the production of the CPM progress schedule required by the Contract, the Contractor shall use Primavera Project Planner, the latest version for Windows 95, or later. The computer hardware and software furnished shall include original instruction manuals and other documentation normally provided with the software."

In the Special Provisions, Section 10-1.13, "Obstructions", the fourth paragraph is revised as follows:

"It is anticipated that the following utility facilities will be relocated prior or during construction. The Contractor is required to coordinate with the utility company.

Utility	Location	Estimated Schedule to Finish Relocation
410 mm PG&E - Hot Oil	South (U/G)	4/15/00
300 mm S.S. CVSD - Sewer	South (U/G)	4/15/00
PacBell - Fiber Optic Cable	North (U/G)	4/15/00
PG&E - Electric	North (O/H)	Prior to Start of Construction
PacBell - Telephone	North (O/H)	Prior to Start of Construction

In the Special Provisions, Section 10-1.13, "Obstructions", fifth paragraph, the table is revised as follows:

Utility	Location
600 mm City of Vallejo - Water	North (U/G)
500 mm EBMUD - Water	South (U/G)
100 mm C&H Sugar - Electric Conduit	South (U/G)
450 mm C&H Sugar - Sewer Out Fall	South (U/G)
250 mm S.S. C&H - Force Main	South (U/G)
Caltrans - Compressed air- To be capped	North
Caltrans - Water To be capped	North Maintenance Station
Caltrans - Electric To be capped	North Maintenance Station
Caltrans - 150MM Sewer Abandon to Nearest Manhole	North Maintenance Station

In the Special Provisions, Section 10-1.26A, "Relocate Backup Generator and Trash Enclosure" is revised as attached.

In the Special Provisions, Section 10-1.31, “Earthwork”, the seventeenth paragraph is revised as follows:

"The Contractor shall monitor the adjacent bridge structure during excavation and pile driving at the South Anchorage. The lateral movement and settlement of the soil behind the excavation shall not exceed 5 mm."

In the Special Provisions, Section 10-1.44.5, "Test Borings" is added as attached.

In the Special Provisions, Section 10-1.45, “Piling”, is revised as attached.

In the Special Provisions, Section 10-1.46, "Drilled Holes" is revised as attached.

In the Special Provisions, Section 10-1.49, "Joint Seal Assemblies (Movement Rating Exceeding 100 MM)" is revised as attached.

In the Special Provisions, Section 10-1.56, "Steel Structures", subsection "Cable System", the sixth paragraph is revised as follows:

"Calculations, when requested, and working drawings shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California, and who is experienced with this type of work. The Contractor shall allow the Engineer 8 weeks to review the drawings after a complete set has been received."

In the Special Provisions, Section 10-1.56, "Steel Structures", subsection Measurement and Payment, the second paragraph is revised as follows:

"Structural steel (orthotropic box girder) will be measured and paid for as furnish structural steel (bridge) and erect structural steel bridge. The contract lump sum price paid for furnish cable system of the types shown in the Engineer’s Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing cable system, complete in place, including furnishing and fabrication of the main cable wire, wrapping wire, suspender ropes, main cable tie-down ropes, handropes, cable shrouds, cable sleeves, anchor rods, strand shoes, anchor girders, cable bands, tower saddles, splay saddles, cable tie-downs castings, cable gates, cable band caulking, tie-down anchor frame, anchor frame bracing, and appurtenances, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer."

In the Special Provisions, Section 10-1.56, "Steel Structures", subsection Measurement and Payment, the second paragraph is revised as follows:

"The contract lump sum price paid for erect cable system of the types shown in the Engineer’s Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in erecting cable system, complete in place, including erecting the main cables, suspender ropes, handrope system, cable saddles, splay saddles, cable bands, tie-down anchor frame, anchor frame bracing, appurtenances, temporary structures and falsework, and testing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer."

In the Special Provisions, Section 10-1.56, "Steel Structures", subsection Measurement and Payment, the following paragraph is added after the sixth paragraph:

"If a portion or all of the structural steel is fabricated more than 480 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in these expenses, it is agreed that payment to the Contractor for furnishing the structural steel from each fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles will be reduced $5000 or by an amount computed at $0.044 per kilogram of structural steel fabricated, whichever is greater, or in the case of each fabrication site located more than 4800 air line kilometers from both Sacramento and Los Angeles, payment will be reduced $8000 or by $0.079 per kilogram of structural steel fabricated, whichever is greater."

In the Special Provisions, Section 10-5.01, "Mechanical Work", the attached subsection "Water Piping" is added after subsection "Compressed Air and Condensate Drain Piping".

In the Special Provisions, Section 13-1.01, "General", the following paragraph is added after the first paragraph:

"The agreement (State Agreement No. 04R282) between the Union Pacific Railroad Company and the State of California relating to this contract is available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5549, email duty_senior_tollbridge_district04@dot.ca.gov. The agreement is also available via the Internet at http://www.dot.ca.gov/hq/esc/tollbridge/Carquin/Carquinez.html."

In the Special Provisions, Section 13-1.01, "General", subsection "Railroad Requirements", the following paragraph is added after the twentieth paragraph:

"The Contractor must understand the Contractor's right to enter Railroad's property is subject to the absolute right of Railroad to cause the Contractor's work on Railroad's property to cease if, in the opinion of the Railroad, Contractor's activities create a hazard to Railroad's property, employees, and/or operations."

In the Proposal and Contract, under "Bridge Seismic Retrofit Information/Questionnaire", I. Organization/Experience, the following item is added:

"10) Summarize the bidder’s experience in dealing with the local community and the area businesses as well as the civic representatives."

In the Proposal and Contract, the Engineer’s Estimate Items 2, 52, 102, 103, 104, 105, 106 are revised, Item 50 is deleted as attached.

To Proposal and Contract book holders:

- REPLACE PAGES 3, 5, AND 8 OF THE ENGINEER'S ESTIMATE IN THE PROPOSAL WITH THE ATTACHED REVISED PAGES 3, 5, AND 8 OF THE ENGINEER'S ESTIMATE. THE REVISED ENGINEER'S ESTIMATE IS TO BE USED IN THE BID.

- INDICATE RECEIPT OF THIS ADDENDUM BY FILLING IN THE NUMBER OF THIS ADDENDUM IN THE SPACE PROVIDED ON THE SIGNATURE PAGE OF THE PROPOSAL.

- Submit bids in the Proposal and Contract book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

- Inform subcontractors and suppliers as necessary.

This office is sending this addendum by UPS overnight mail to all book holders to ensure that each receives it.

If you are not a Proposal and Contract book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY

NICK YAMBAO, Chief
Office of Plans, Specifications & Estimates
Division of Office Engineer

Attachments

5-1.12 OUT OF STATE AND FOREIGN MATERIALS

Section 6-1.08, "Foreign Materials," of the Standard Specifications is replaced with the following section:

6-1.08 Out of State and Foreign Materials.— Materials which are manufactured, produced or fabricated outside of California or the United States shall be delivered to a distribution point in California, unless otherwise required in these specifications or the special provisions, where they shall be retained for a sufficient period of time to permit inspection, sampling, and testing.

Attention is directed to the provisions in Section 8-1.07, "Liquidated Damages." The Contractor shall not be entitled to an extension of time for acts or events occurring outside of California and the United States and it shall be the Contractor's responsibility to deliver materials obtained from outside of California and the United States to the point of entry into the California in sufficient time to permit timely delivery to the job site.

The Contractor, at no cost to the State, shall supply the facilities and arrange for any testing required in California which the State is not equipped to perform. All testing by the Contractor shall be subject to witnessing by the Engineer.

The manufacturer, producer or fabricator of foreign material shall furnish to the Engineer a Certificate of Compliance in accordance with the provisions in Section 6-1.07, "Certificates of Compliance." In addition, certified mill test reports clearly identifiable to the lot of material shall be furnished where required in these specifications or otherwise requested by the Engineer.

If the manufacturing, fabrication or welding of steel for structural steel members, cable system components, high strength fasteners, or the casting and prestressing of precast prestressed concrete members is to be performed outside of California or the United States, the following requirements shall apply:

1. Such manufacturing, fabrication, welding or casting shall be performed only within the plants and by manufacturers or fabricators who have previously established, to the satisfaction of the Engineer, that they have the experience, knowledge, trained manpower, quality controls, equipment and other facilities required to produce the quality and quantity of work required. At the option of the Engineer, prequalification of the plant and fabricator will be established either by the submission of detailed written proof thereof or through in-plant inspection by the Engineer or the Engineer's representative, or both.

2. The Contractor shall make written application to the Engineer for approval for such manufacturing, fabrication or casting at the earliest possible time and in no case later than 120 days in advance of the planned start of manufacture, fabrication or casting. The application shall list the specific units or portion of a work which will be manufactured, fabricated or cast outside California or the United States.

3. The Contractor shall advise the Engineer, in writing, al least 90 days in advance on the actual start of any such manufacturing, fabrication or casting.

4. All documents pertaining to the contract, including but not limited to, correspondence, bid documents, working drawings and data shall be written in the English language and all numerical data shall use the International System of Units (SI) for measurement.

The use of steel manufactured outside of the United States as unidentified stock material, as provided in Section 55-2.07, "Unidentified Stock Material," will not be allowed.

5-1.24 FORCE ACCOUNT PAYMENT

The second, third and fourth paragraphs of Section 9-1.03A, "Work Performed by Contractor," of the Standard Specifications, shall not apply.

Attention is directed to "Progress Schedule (Critical Path) of these special provisions.

To the total of the direct costs for work performed on a force account basis, computed as provided in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications, there will be added a markup of 25 percent to the cost of labor, 10 percent to the cost of materials, and 10 percent to the equipment rental. These markups shall be applied to all work performed on a force account basis, regardless of whether the work revises the current contract completion date.

The above markups, together with payments made for time related overhead pursuant to "Overhead" of these special provisions, shall constitute full compensation for all overhead costs for work performed on a force account basis. These overhead costs shall be deemed to include all items of expense not specifically designated as cost or equipment rental in Sections 9-1.03A(1), "Labor," 9-1.03A(2), "Materials," and 9-1.03A(3), "Equipment Rental," of the Standard Specifications. The total payment made as provided above and in the first paragraph of Section 9-1.03A, "Work Performed by Contractor," shall be deemed to be the actual cost of the work performed on a force account basis, and shall constitute full compensation therefor. Full compensation for all overhead costs for work performed on a force account basis, and for which no adjustment is made to the contract lump sum price for related overhead pursuant to "Overhead" of these special provisions, shall be considered as included in the markups specified above, and no additional compensation will be allowed therefor.

When extra work to be paid for on a force account basis is performed by a subcontractor, approved in accordance with the provisions in Section 8-1.01, “Subcontracting,” of the Standard Specifications, an additional markup of 5 percent will be added to the total cost of said extra work including all markups specified in this section "Force Account Payment". Said additional 5 percent markup shall reimburse the Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

5-1.25 OVERHEAD

The Contractor will be compensated for overhead in accordance with these special provisions.

Attention is directed to "Force Account Payment" and "Progress Schedule (Critical Path)" of these special provisions.

Section 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply.

Time related overhead shall consist of those overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work.

The contract lump sum price paid for time related overhead shall include full compensation for time related overhead incurred by the Contractor and by any joint venture partner, subcontractor, supplier or other party associated with the Contractor.

The contract lump sum price bid for time related overhead will be adjusted only as a result of suspensions and adjustments of time which revise the current contract completion date and which are also any of the following:

1) suspensions of work ordered in accordance with Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

    a) suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the contract; and
    b) suspensions ordered due to unsuitable weather conditions;

2) extensions of time granted by the State in accordance with the provisions of the fifth paragraph of Section 8-1.07, "Liquidated Damages," of the Standard Specifications; or
3) reductions in contract time set forth in approved contract change orders, in accordance with Section 4-1.03, "Changes," of the Standard Specifications.

For each day the number of calendar days bid to complete the contract (days bid to complete Phase I plus 200 days), in conformance with the provisions in Section 4, "Beginning Of Work, Time Of Completion And Liquidated Damages," of these special provisions, is adjusted due to suspensions or adjustments as specified above, the lump sum price for time related overhead will be adjusted by an amount equal to the contract lump sum price bid for time related overhead divided by the number of calendar days bid to complete the contract. The provisions in Sections 4-1.03B, "Increased or Decreased Quantities" and 4-1.03C, "Changes in Character of the Work," of the Standard Specifications, shall not apply to time related overhead.

For the purpose of making partial payments pursuant to Section 9-1.06, “Partial Payments,” of the Standard Specifications, time related overhead to be paid in each monthly estimate will be based on the number of working days that occurred during that monthly estimate period. The amount earned per day for time related overhead shall be the lesser of the following amounts:

1) the contract lump sum price for time related overhead, divided by the number of calendar days bid to complete the contract (days bid to complete Phase I plus 200 days), in conformance with the provisions in Section 4, "Beginning Of Work, Time Of Completion And Liquidated Damages," of these special provisions; or
2) fifteen percent of the original contract amount, divided by the number of calendar days bid to complete the contract (days bid to complete Phase I plus 200 days), in conformance with the provisions in Section 4, "Beginning Of Work, Time Of Completion And Liquidated Damages," of these special provisions.

After acceptance of the contract pursuant to Section 7-1.17, “Acceptance of Contract,” of the Standard Specifications, the amount, if any, of the contract lump sum price for time related overhead not yet paid will be included for payment in the first estimate made after acceptance of the contract in accordance with Section 9-1.07, “Payment after Acceptance,” of the Standard Specifications.

Full compensation for all overhead costs, including overhead costs for increases in the quantity of contract items of work; other than time related overhead paid for as specified above, and other than overhead costs included in the markups specified in "Force Account Payment" of these special provisions; shall be considered as included in the various items of work and no additional compensation will be allowed therefor.

5-1.37 RELATIONS WITH LOCAL BUSINESSES

C&H SUGAR COMPANY, INC.

This project is located within the limits of the C&H Lease Property. A Construction Access Agreement, dated October 11, 1999, has been issued covering work to be performed under this contract. The Contractor shall be fully informed of all rules, regulations and conditions of the agreement that may govern the Contractor's operations in said area and shall conduct the Contractor's work accordingly. Said document shall be considered a part of, and shall become, an integral part of the special provisions and contract for this project.

Copies of the Construction Access Agreement may be obtained at the Department of Transportation, Plans and Bid Documents, Room 0200, Transportation Building, 1120 N Street, P.O. Box 942874, Sacramento, California 94274-0001, Telephone No. (916)654-4490, and are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5549, email duty_senior_tollbridge_district04@dot.ca.gov.

Attention is directed to Section 7-1.08, "Public Convenience," 7-1.09, "Public Safety," 7-1.11, "Preservation of Property," and 7-1.12, "Responsibility for Damage," of the Standard Specifications.

Any modifications to the agreement which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the C&H Sugar Company, Inc. for their consideration.

When the Contractor is notified by the Engineer that a modification to the permit is under consideration, no work will be allowed on the proposed modification until the Department takes action on the proposed modification. Any modifications to any agreement between the Department of Transportation and C&H Sugar Company, Inc. shall be fully binding on the Contractor, and the provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

Full compensation for conforming to the requirements of this section shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

PACIFIC GAS AND ELECTRIC COMPANY

This project is located within the limits of certain lands owned by the Pacific Gas and Electric Company. The Department of Transportation has obtained an easement, dated September 28, 1999, for the use of a portion of the Pacific Gas and Electric Company's lands for this contract. The Contractor shall be fully informed of all rules, regulations and conditions of the easement that may govern the Contractor's operations in said area and shall conduct the Contractor's work accordingly. Said document shall be considered a part of, and shall become, an integral part of the special provisions and contract for this project.

Copies of the easement may be obtained at the Department of Transportation, Plans and Bid Documents, Room 0200, Transportation Building, 1120 N Street, P.O. Box 942874, Sacramento, California 94274-0001, Telephone No. (916)654-4490, and are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5549, email duty_senior_tollbridge_district04@dot.ca.gov.

Attention is directed to Section 7-1.08, "Public Convenience," 7-1.09, "Public Safety," 7-1.11, "Preservation of Property," and 7-1.12, "Responsibility for Damage," of the Standard Specifications.

The Contractor shall not perform any work that reduces the vertical clearance between the Pacific Gas and Electric Company's existing electric transmission lines and the ground thereunder below the minimum requirements set forth in General Order No. 95 of the Public Utilities Commission of the State of California.

No temporary or permanent tiebacks shall be used within Pacific Gas and Electric easement.

Any modifications to the above listed conditions which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the Pacific Gas and Electric Company for their consideration.

When the Contractor is notified by the Engineer that a modification to the permit is under consideration, no work will be allowed on the proposed modification until the Department takes action on the proposed modification. Any modifications to any agreement between the Department of Transportation and C&H Sugar Company, Inc. shall be fully binding on the Contractor, and the provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

Full compensation for conforming to the requirements of this section shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

5-1.38 RELATIONS WITH CALIFORNIA STATE UNIVERSITY MARITIME ACADEMY

This project is located within the limits of the California State University Maritime Academy property. A Temporary Permit (Document No. 56952), Amendment No. 1 to Temporary Permit, and Amendment No. 2 have been issued covering work to be performed under this contract. The Contractor shall be fully informed of all rules, regulations and conditions of the permit that may govern the Contractor's operations in said area and shall conduct the Contractor's work accordingly. Said document shall be considered a part of, and shall become, an integral part of the special provisions and contract for this project.

Copies of the temporary permit and addenda may be obtained at the Department of Transportation, Plans and Bid Documents, Room 0200, Transportation Building, 1120 N Street, P.O. Box 942874, Sacramento, California 94274-0001, Telephone No. (916)654-4490, and are available for inspection at the Toll Bridge Program Duty Senior at District 04 Office, 111 Grand Avenue, Oakland, California 94612, telephone number (510) 286-5549, email duty_senior_tollbridge_district04@dot.ca.gov.

Attention is directed to Section 7-1.11, "Preservation of Property,"7-1.12, "Responsibility for Damage," and 7-1.121, "Indemnification," and 7-1.22, "Insurance," of the Standard Specifications.

Modifications to the permit which are proposed by the Contractor shall be submitted in writing to the Engineer for transmittal to the California State University Maritime Academy for their consideration.

When the Contractor is notified by the Engineer that a modification to the permit is under consideration, no work shall be performed which is inconsistent with the original agreement or proposed modification until the Department takes action on the proposed modifications.

Modifications to any agreement between the Department of Transportation and the California State University Maritime Academy shall be fully binding on the Contractor. The provisions of this section shall be made a part of every subcontract executed pursuant to this contract.

The Contractor shall not at any time occupy property owned by California Maritime Academy to store construction vehicles, equipment, or material.

Construction access road along the northern waterfront toward the bridge shall be as such so that no interference with the mooring dolphin may occur. At no time shall there be any threat of damage to the mooring dolphin.

Maritime Academy drive shall remain unobstructed throughout the life of the construction.

Contractor shall abide by CMA's regulations concerning speed limits, noise emissions, and dust when traveling on or occupying CMA owned property.

Full compensation for conforming to the requirements of this section shall be considered as included in the contract prices paid for the various contract items of work and no additional compensation will be allowed therefor.

SECTION 8-4. ULTIMATE SPLICE TESTING

8-4.01 BAR REINFORCEMENT SPLICE TESTING (ULTIMATE BUTT SPLICES)

Ultimate butt splices and the testing of these splices shall conform to the provisions in "Reinforcement" of these special provisions and the requirements herein.

The length of any type of ultimate mechanical butt splice shall not exceed 10 times the bar diameter of the bar to be spliced.

Ultimate butt splices shall be used at the following locations:

ULTIMATE BUTT SPLICE LOCATIONS

Location No.	Bridge No.	Portion of Structure	Bar Size	Bar Description
1	28-0367L	Bent 7 Columns	No. 25	hoops
2	28-0367L	Bent 7 Columns	No. 32	Main column reinforcement

At the Contractor's option, the Contractor may use ultimate butt splices in place of butt welded splices shown on the plans.

The independent qualified testing laboratory used to perform the testing of all ultimate butt sample splices and control bars shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project and shall have the following:

1. Proper facilities, including a tensile testing machine capable of breaking the largest size of bar to be tested.
2. A device for measuring the total slip of the reinforcing bars within the splice to the nearest 25 µm. This device shall be placed parallel to the longitudinal axis of the bar and shall be able to simultaneously measure movement on both sides of the splice.
3. Operators who have received formal training for performing the testing requirements of ASTM Designation: A 370/A 370M and California Test 670.
4. A record of annual calibration of testing equipment. The calibration shall be performed by an independent third party that has 1) standards that are traceable to the National Institute of Standards and Technology and 2) a formal reporting procedure, including published test forms.

The Contractor shall designate in writing an ultimate butt splicing Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for the quality of all ultimate butt splicing, including materials and workmanship, performed by the Contractor and all subcontractors.

The QCM shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors, who will provide other services or materials for the project. The QCM may be an employee of the Contractor.

The QCM shall be the sole individual responsible to the Contractor for submitting, receiving, and approving all correspondence, required submittals, and reports regarding ultimate butt splicing to and from the Engineer.

Whenever any lot of ultimate butt splices is rejected, no additional ultimate butt splices shall be placed until the QCM performs a complete review of the Contractor's quality control process and submits written evidence, acceptable to the Engineer, that all remaining splices in this lot conform to the specifications.

Sample splices shall be 1) a minimum length of 1.5 meters for reinforcing bars No. 25 or smaller and 2 meters for reinforcing bars No. 29 or larger, with the splice located at mid-point, and 2) suitably identified prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals.

A minimum of one control bar shall be removed from the same bar as, and adjacent to, each sample splice. Control bars shall be 1) a minimum length of one meter for reinforcing bars No. 25 or smaller and 1.5 meters for reinforcing bars No. 29 or larger, and 2) suitably identified prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. The portion of adjacent bar remaining in the work shall also be identified with weatherproof markings that correspond to its adjacent control bar.

Shorter length sample splice and control bars may be furnished if approved in writing by the Engineer.

Each sample splice and its associated control bar shall be identified and marked as a set. Each set shall be identified as representing either a prequalification, production, or job control sample splice.

The portion of hoop reinforcing bar, removed to obtain a sample splice and control bar, shall be repaired using a prequalified ultimate mechanical butt splice or the hoop shall be replaced in kind.

Reinforcing bars, other than hoops, from which sample splices are removed shall be repaired using prequalified ultimate mechanical butt splices or the bars shall be replaced in kind. These bars shall be repaired or replaced such that no splices are located in the "No Splice Zone" shown on the plans.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications shall not apply.

ULTIMATE BUTT SPLICE TEST CRITERIA.— Ultimate prequalification, production, and job control sample splices shall be tensile tested in conformance with the requirements described in ASTM Designation: A 370/A 370M and California Test 670.

Ultimate prequalification and production sample splices shall rupture in the reinforcing bar either: 1) outside of the affected zone or 2) within the affected zone, provided that the sample has achieved at least 95 percent of the ultimate tensile strength of the control bar associated with the sample. In addition, necking of the bar shall be visibly evident at rupture regardless of whether the bar breaks inside or outside the affected zone.

The affected zone is the portion of the reinforcing bar where any properties of the bar, including the physical, metallurgical, or material characteristics, have been altered by fabrication or installation of the splice.

The ultimate tensile strength of each control bar shall be determined by tensile testing the bar to rupture. If 2 control bars are tested for one sample splice, the bar with the lower ultimate tensile strength shall be considered the control bar.

Testing to determine the minimum tensile strength, in conformance with the provisions in the ninth paragraph of Section 52-1.08, "Splicing," of the Standard Specifications, will not be required.

PREQUALIFICATION TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES.—Prior to use in the work, all welded and mechanical ultimate butt splices shall conform to the following prequalification test requirements:

Four prequalification sample splices for each splice type, including ultimate mechanical butt splices, ultimate complete joint penetration butt welded splices, and ultimate resistance butt welded splices that will be used in the work, shall be fabricated by the Contractor and furnished to the Engineer for testing. In addition, for sleeve-filler metal, sleeve-swaged, sleeve-extruded, sleeve-filler grout, and sleeve-lockshear bolt types of couplers, 4 sample prequalification splices shall be fabricated for each bar deformation pattern that will be used in the work.

If different diameters of hoop reinforcement are shown on the plans, prequalification sample splices, as described above, will only be required for the smallest hoop diameter. In addition, these splices shall be fabricated using the same radius as shown on the plans for said hoops.

Unless otherwise directed in writing by the Engineer, all prequalification sample splices and control bar sets shall be shipped to the Office of Materials Engineering and Testing Services, 5900 Folsom Boulevard, Sacramento, CA 95819, telephone (916) 227-7251.

The 4 sets from each prequalification test shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 sets will not be tested.

All 4 sample splices from each prequalification test shall conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, and Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications.

Test results for each bundle of 4 sets will be reported in writing to the Contractor within 10 working days after receipt of the bundle by the Office of Materials Engineering and Testing Services. In the event that more than one bundle is received on the same day, 2 additional calendar days shall be allowed for providing test results for each additional bundle received. A test report will be made for each bundle received.

Should the Engineer fail to provide the test results within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in providing the test results, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

PRODUCTION TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES.—Production tests shall be performed for all welded and mechanical ultimate butt splices used in the work. A production test shall consist of 4 sets of sample splices and control bars removed from each lot of completed splices.

A lot of hoop reinforcing bars at location No. __1___ is defined as 1) 150, or fraction thereof, of the same type of ultimate mechanical butt splices used for each bar size and each bar deformation pattern that is used in the work at said location or 2) 150, or fraction thereof, of ultimate complete joint penetration butt welded splices, or ultimate resistance butt welded splices for each bar size used in the work at said location.

For reinforcement at location No. __2___, a lot is defined as 1) 150, or fraction thereof, of the same type of ultimate mechanical butt splices used for each bar size and each bar deformation pattern that is used in the work at said location or 2) 150, or fraction thereof, of ultimate complete joint penetration butt welded splices, or ultimate resistance butt welded splices for each bar size used in the work at said location.

After all splices in a lot have been completed, the QCM shall notify the Engineer in writing that all couplers in said lot conform to the specifications and are ready for testing. After notification has been received, the Engineer will select the 4 sample splices to be removed from the lot and place tamper-proof markings or seals on them. The Contractor or QCM shall select the adjacent control bar for each sample splice bar and the Engineer will place tamper-proof markings or seals on them. These ultimate production sample splices and control bars shall be removed by the Contractor, and tested by an independent qualified testing laboratory, both in the presence of the Engineer or the Engineer's authorized representative.

The Engineer or the Engineer's authorized representative will be at the independent qualified testing laboratory within a maximum of 5 working days after receiving written notification that the samples are at the laboratory and ready for testing. Should the Engineer or the Engineer's authorized representative fail to be at the laboratory within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A sample splice or control bar from any set will be rejected if any tamper-proof marking or seal is disturbed prior to testing.

The 4 sets from each production test shall be securely bundled together and identified with a completed sample identification card prior to shipment to the independent laboratory. The card will be furnished by the Engineer. Bundles containing fewer than 4 sets shall not be tested.

A Test Report for all testing performed on each lot shall be prepared by the independent testing laboratory performing the testing and submitted to the QCM for review and approval. The report shall be signed by an engineer, who represents the laboratory, and is registered as a Civil Engineer in the State of California. The report shall include, as a minimum, the following information for each set: contract number, bridge number, lot number and location, bar size, type of splice, length of mechanical splice, physical condition of test sample splice and control bar, any notable defects, limits of affected zone, total measured slip, location of visible necking area, ultimate strength of each splice, ultimate strength and 95 percent of this ultimate strength for each control bar, and a comparison between 95 percent of the ultimate strength of each control bar and the ultimate strength of its associated splice.

The QCM must review, approve and forward each Test Report to the Engineer for review before any splices represented by the report are encased in concrete. The Engineer shall have 3 working days to review each Test Report and respond in writing after a complete report has been received. Should the Contractor elect to encase any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Prior to performing any tensile tests on production test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip specified in Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications. Should this sample not meet these requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. Should any of these 3 samples not conform to said requirements, all splices in the lot represented by said production test will be rejected.

Should more than one sample splice from any production test fail to conform to the requirements of "Ultimate Butt Splice Test Criteria" specified herein, additional production tests shall be performed until at least 75 percent of the cumulative total of all individual sample splices tested in each lot conforms to said requirements.

If a production test for any lot fails, the Contractor will be required to repair or replace all reinforcing bars from which sample splices were removed, complete in place, before the Engineer selects any additional splices from said lot for further testing.

Production tests will not be required on any repaired splice from a lot, regardless of the type of prequalified ultimate mechanical butt splice used to make the repair, once a production test is successful.

Should additional production tests be required, any repaired splice may be selected by the Engineer for use in the additional production tests

If a splice type other than the kind used to make the original splice is used to make a repair splice, and if more than one additional production test is required for a lot represented by these splices, these splices shall be considered a separate lot for the purposes of performing production tests.

QUALITY ASSURANCE TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES.— For the first production test performed, and for at least one, randomly selected by the Engineer, of every 5 additional production tests, or portion thereof, performed thereafter, the Contractor shall concurrently prepare 4 additional ultimate job control sample splices along with associated control bars. These ultimate job control samples shall be prepared in the same manner as specified herein for ultimate prequalification sample splices and control bars.

Each time 4 additional ultimate job control sample splices are prepared, 2 of these job control sample splice and associated control bar sets and 2 of the production sample splice and associated control bar sets, together, shall conform to the requirements for ultimate production sample splices in "Production Test Requirements for Ultimate Butt Splices" specified herein.

The 2 remaining job control sample splice and associated control bar sets, along with the 2 remaining production sample splice and associated control bar sets shall be shipped, unless otherwise directed in writing by the Engineer, to the Office of Materials Engineering and Testing Services, 5900 Folsom Boulevard, Sacramento, CA 95819, telephone (916) 227-7251 for quality assurance testing. The 4 sets shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 sets will not be tested.

Quality assurance testing will be performed to verify that the splices conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein and Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications. Should more than one sample splice from any quality assurance test fail to conform to these requirements, all splices in the lot represented by the test will be rejected.

Test results for each bundle of 4 sets will be reported in writing to the Contractor within 3 working days after receipt of the bundle by the Office of Materials Engineering and Testing Services. In the event that more than one bundle is received on the same day, one additional calendar day shall be allowed for providing test results for each additional bundle received. A test report will be made for each bundle received. Should the Contractor elect to encase any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. “Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

MEASUREMENT AND PAYMENT.— Full compensation for conforming to all of the requirements of this section, Bar Reinforcement Splice Testing (Ultimate Butt Splices), shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

10-1.01 ORDER OF WORK

Order of work shall conform to the provisions in Section 5-1.05, "Order of Work," of the Standard Specifications and these special provisions.

No overhead sign panel shall be installed until the overhead sign lighting is completely operational.

No above ground electrical work shall be performed on any system within the project site until all Contractor-furnished electrical materials for that individual system have been tested and delivered to Contractor.

Attention is directed to "Maintaining Traffic" and "Temporary Pavement Delineation" of these special provisions and to the stage construction sheets of the plans.

Attention is directed to "Progress Schedule (Critical Path)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 10 days after approval of the contract. The diagram shall be submitted prior to performing any work that may be affected by any proposed deviations to the construction staging of the project.

The work shall be performed in conformance with the stages of construction shown on the plans. Non-conflicting work in subsequent stages may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction.

In each stage, after completion of the preceding stage, the first order of work shall be the removal of existing pavement delineation as directed by the Engineer. Pavement delineation removal shall be coordinated with new delineation so that lane lines are provided at all times on traveled ways open to public traffic.

The Contractor shall notify the Engineer at least 7 (seven) days prior to each stage and phase of work that may disrupt the toll plaza median area, or affect toll plaza operations.

At the end of each working day if a difference in excess of 225-millimeters exists between the elevation of the existing pavement and the elevation of any excavation within 1.5 m left of the traveled way, and 225 millimeters exists between the elevation of the existing pavement and the elevation of any excavation within 2.4 meters of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose; however no contaminated or hazardous materials shall be used. Also, once the placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. Treated base shall not be used for the taper. Full compensation for placing the material on a 1:4 slope, regardless of the number of times it is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and no additional compensation will be allowed therefor. No payment will be made for material placed in excess of that required for the structural section.

At locations exposed to public traffic where guard railings are to be constructed, or removed and replaced, the Contractor shall schedule the operations so that at the end of each working day there shall be no post holes open nor shall there be any railing posts installed without the blocks and rail elements assembled and mounted thereon.

Temporary crash cushion modules and temporary railing (Type K) shall be in place at locations shown on the plans prior to starting any adjacent construction activities.

If work is performed in or from the easterly (number 1) lane and/or the easterly shoulder after the completion of Phase I, the contractor shall provide temporary railing (Type K) between the work area and the public traffic for the entire length of the bridge and the approaches. All costs incurred for the placement, maintenance and the removal of the k-rail shall be considered included in other items of work and no separate payment will be made. Attention is directed to “Relations with Coast Guard” and “Construction Area Enclosure” of these special provisions.

A first order of work shall be to relocate utilities at the South Anchorage, and constructing all elements of Electrical Substation to provide UNINTERRUPTIBLE POWER SUPPLY (UPS). Attention is directed to Sections 10-3.47 “SUBSTATION BUILDING UNINTERRUPTIBLE POWER SUPPLY (UPS),” of these special provisions.

C&H utility work shall not be performed during the months of November and December. All work affecting service of the electrical, water, or sewer systems shall be performed during scheduled C&H plant shutdown periods, generally four days every other weekend.

Contractor shall verify C&H shutdown periods and schedule the work accordingly.

A first order of work shall be to order treated timber for timber facing for the north and south fenders and dolphins.

The Contractor shall submit to the Engineer for approval, within 15 days after the award of the contract, a lighting plan which complies with Coast Guard requirements for navigational lighting.

The Contractor shall notify the Engineer, in writing, not less than 15 days prior to performing any work within, adjacent to or affecting the navigable waters.

Work shall be such that free navigation of the waterway, navigable depths and channel widths are not impaired, except as otherwise allowed by the U.S. Coast Guard.

The Contractor shall perform all work in the shallow areas along the shore between December 1 and March 31 as dictated by Section 5-1.20 of these Special Provisions. No work will be allowed below the MHHW level outside the above mentioned dates.

Unless the Engineer approved, no work will be allowed at existing Maintenance Station until April 15, 2000.

Unless the Engineer approved, North Anchorage excavation shall not be performed until Pacific Bell Fabric Optic Cable is relocated. Attention is directed to Section 10-1.13 "OBSTRUCTIONS," of these Special Provisions.

Unless the Engineer approved, South Anchorage excavation shall not be performed until CVSD 300mm Sewer Line and PG&E 410mm Hot Oil Line are relocated. Attention is directed to Section 10-1.13 "OBSTRUCTIONS," of these Special Provisions.

The Contractor shall provide a Stormwater Pollution Prevention Plan prior to beginning construction. The Stormwater Pollution Prevention Plan shall include measures for controlling dust, debris and sediment, and shall specify storage locations for soil and control measures at those locations to prevent the material from becoming airborne or conveyed into water bodies and all other requirements in Section 10-1.02 of these Special Provisions.

The Contractor shall control dust at the source by application of water or other acceptable dust control agent as determined by the Engineer.

The Contractor shall notify the C&H Sugar Company prior to pile driving operations within 305 meters of their computerized warehouse facility. The C&H Sugar Company contact is Manager Utilities/Services, telephone no. (510) 787-4303.

Bent 7 Crockett Viaduct shall be completed 180 days prior to the completion of Phase I work as indicated on an approved work schedule. The Contractor's access to the area from Bent 6 of the Crockett Viaduct to Pier P1 shall be restricted from 180 days prior to completion of Phase I work as indicated on the approved work schedule to 14 days after completion of Phase I work, to allow construction of Crockett Viaduct being constructed under a separate contract. The Contractor's work area from Bent 6 of the Crockett Viaduct to Pier P1 shall be limited to the following areas:

1) The area bounded by the South Anchorage footing plus one meter all around the footing and the vertical projection of this area up to a height of 25 meters above finish grade.

2) The area within a 3 meter radius of the centerline of the supension cable for the full length of the suspension cable from the South Anchorage to Pier P1.

3) The area beyond 28 meters both left and right of the centerline of the South Anchorage and the vertical projection of this area from Bent 6 of the Crockett Viaduct to Pier P1.

Failure to meet the above completion date for Bent 7 Crockett Viaduct and encroaching outside of the permitted work area between the aforementioned dates will result in Contractor penalties of $5,000 per day for every day the completion date is delayed beyond the 180 days prior to completion of Phase I work, or for every day that encroachment outside of the permitted work area occurs. Such penalties shall be deducted from moneys that are due or will become due the Contractor.

10-1.10 COOPERATION

Attention is directed to Sections 7-1.14, "Cooperation," and 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications and these special provisions.

Attention is directed to "Joint Seal Assemblies (Movement Rating Exceeding 100 mm)" of these special provisions.

Work on Contract Nos. 04-013054, 04-043934, 04-006074 and 04-0T0504 will be in progress adjacent to the project limits of this contract. The Contractor shall coordinate their operations with all agencies, other contractors and the State work forces performing work within these contract limits and those installing Crockett Viaduct structure and electrical systems.

At least 6 months prior to the estimated date of project completion, the Engineer will call a meeting of the Contractor and the contractor of the adjoining contract (Contract No. 04-013054) to discuss coordination of construction operations and accommodation of access to all common construction areas so that the work on both contracts can be completed expeditiously without undue delay and that both contracts be completed as close to the same completion date as the work constraints allow. From the contract award date through the completion of this contract, the Contractor shall cooperate with the adjoining contractor and all other forces, in all respects, to insure that the objective of timely completion of both projects is attained.

The Contractor shall provide access to Pier P1 after completion of bent cap backwall for placement of Crockett Viaduct support bearings, girders, and deck slab.

Progress schedules for Contract No. 04-013054, if available, may be inspected by the Contractor upon written request to the Engineer. Such progress schedules are tentative and cannot be guaranteed accurate.

In the event of a loss caused to the Contractor due to unnecessary delays or failure to finish the work within the time specified for completion caused by another contractor under contract with the Department performing work for the State, the State will reimburse the delayed contractor in conformance with the provisions in Section 8-1.09 "Right of Way Delays," of the Standard Specifications. Deductions will be made from any moneys due or that may become due the Contractor causing the loss or delay.

10-1.26A RELOCATE BACKUP GENERATOR AND TRASH ENCLOSURE

The existing backup generator and trash enclosure shall be relocated by the Contractor. The Contractor shall submit working drawings and a plan for the Engineer's approval as provided in Section 5-1.02, “Plans and Working Drawings,” of the Standard Specifications prior to start of this work. Any periods the backup generator and the trash enclosure will not be operational must be approved by the Engineer.

The work shall include preparation of a concrete base (minor concrete) and all building works for the backup generator and trash enclosure at the new location, moving and installation of the generator and trash enclosure, and all necessary wiring and electrical work. Concrete Base and all building works shall conform to the materials and details shown on the As-Built plans for the existing Carquinez Bridge Toll Plaza and the provisions in "MASONRY BLOCK," of this section.

Copies of the As-Built plans for the existing Carquinez Bridge Toll Plaza can be obtained at the Department of Transportation, office of the Toll Bridge Duty Senior, District 04 Office, 111 Grand Avenue, Oakland, CA 94612, telephone number (510) 286-5549.

The contract lump sum price paid for relocate backup generator and trash enclosure shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in relocating the existing backup generator and trash enclosure, including concrete base and all building works, wiring and electrical work, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

MASONRY BLOCK

Masonry block, consisting of a reinforced hollow unit masonry block stem, shall conform to the provisions in Sections 19, "Earthwork," 52, "Reinforcement," and 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

Sound wall masonry unit stems shall be constructed with joints of portland cement mortar. Wall stems shall be constructed with hand laid block. Wall stems shall not be constructed with preassembled panels.

Concrete for sound wall footings, pile caps and grade beams, if required, shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications.

Reinforcing bars shall conform to the requirements in ASTM Designation: A 706/A 706M.

Concrete masonry units shall be hollow, load bearing, conforming to the requirements in ASTM Designation: C 90, lightweight or medium weight classification, Type II. Standard or open end units may be used. Open end units, if used, shall not reduce the spacing of the bar reinforcement as shown on the plans.

The masonry units shall be nominal size and texture and of uniform color. The color shall be determined by the Engineer, selected from the manufacturer's standards.

When high strength concrete masonry units with f'm=17.2 MPa are shown on the plans, the high strength masonry units shall have a minimum compressive strength of 26 MPa based on net area. Each high strength concrete masonry unit shall be identified with a groove embedded in an interior corner. The groove shall extend from a mortar surface for a length of about 50 mm and shall have a depth of about 5 mm.

Expansion joint filler shall conform to the requirements in ASTM Designation: D 1751 or ASTM Designation: D 2000 2AA-805.

Portland cement mortar shall be colored to match the units. Coloring shall be chemically inert, fade resistant mineral oxide or synthetic type.

Portland cement for wall stems shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications.

Hydrated lime shall conform to the requirements in ASTM Designation: C 207, Type S.

Mortar sand shall be commercial quality.

Mortar for laying masonry units shall consist, by volume, of one part portland cement, 0 to 0.5 parts of hydrated lime, and 2.25 to 3 parts of mortar sand. Sufficient water shall be added to make a workable mortar. Each batch of mortar shall be accurately measured and thoroughly mixed. Mortar shall be freshly mixed as required. Mortar shall not be retempered more than one hour after mixing.

Prepackaged mortar materials and mortar containing admixtures may be used when approved in writing by the Engineer, provided the mortar shall not contain more than 0.05 percent soluble chlorides in conformance with California Test 422 or 0.25 percent soluble sulfates, as SO_4, in conformance with California Test 417.

Prior to laying masonry units using prepackaged mortar materials or mortar containing admixtures, the Contractor shall submit to the Engineer the proposed sources of the materials together with test data from an independent testing laboratory for mortar tested in conformance with California Test 551. The test data shall be from specimens having a moist cure, except, the sample shall not be immersed in lime water. The average 28-day compressive strength of the mortar shall be not less than 17.2 MPa.

Aggregate for grout used to fill masonry units shall consist of fine aggregate and coarse aggregate conforming to the provisions in Section 90-2.02, "Aggregates," of the Standard Specifications. At least 20 percent of the aggregate shall be coarse aggregate. The Contractor shall determine the grading except that 100 percent of the combined grading shall pass the 12.5-mm sieve.

At the option of the Contractor, grout for filling masonry units may be proportioned either by volume or mass. Grout shall contain only enough water to cause it to flow and fill the voids without segregation. The maximum amount of free water shall not exceed 0.7 times the weight of the cement for regular strength masonry. The maximum amount of free water shall not exceed 0.6 times the mass of the cement for high strength masonry.

Grout proportioned by volume for regular strength masonry shall consist of at least one part portland cement and 4.5 parts aggregate. Grout proportioned by volume for high strength masonry shall consist of at least one part portland cement and 3.5 parts aggregate. Aggregate volumes shall be based on a loose, air-dry condition.

Grout proportioned by mass for regular strength masonry shall contain at least 325 kilograms of portland cement per cubic meter. Grout proportioned by mass for high strength masonry shall contain at least 400 kilograms of portland cement per cubic meter.

Construction of reinforced concrete masonry unit wall stems with portland cement mortar joints shall conform to the following:

Concrete masonry unit construction shall be true and plumb in the lateral direction and shall conform to the grade shown on the plans in the longitudinal direction. Bond beam units or recesses for horizontal reinforcement shall be provided.

Mortar joints shall be approximately 10 mm wide. Walls and cross webs forming cells to be filled with grout shall be full bedded in mortar to prevent leakage of grout. All head and bed joints shall be solidly filled with mortar for a distance in from the face of the wall or unit not less than the thickness of the longitudinal face shells. Head joints shall be shoved tight.

Mortared joints around cells to be filled shall be placed so as to preserve the unobstructed vertical continuity of the grout filling. Any overhanging mortar or other obstruction or debris shall be removed from the inside of such cells.

Reinforcement shall be securely held in position at top and bottom with either wire ties or spacing devices and at intervals not exceeding 192 bar diameters prior to placing any grout. Wire shall be 16-gage or heavier. Wooden, aluminum, or plastic spacing devices shall not be used.

Splices in vertical reinforcement will be allowed only where shown on the plans.

Only those cells containing reinforcement shall be filled solidly with grout. All grout in the cells shall be consolidated at the time of placement by vibrating, and reconsolidated after excess moisture has been absorbed, but before plasticity is lost. Slicing with a trowel is not acceptable.

Walls shall be constructed in 1.2-m maximum height lifts. Grouting of each lift shall be completed before beginning masonry unit construction for the next lift. The top course of each lift shall consist of a bond beam.

A construction joint is required at the top of the top course to permit placement of the mortar cap. The mix design for the mortar cap shall be as approved by the Engineer.

Construction joints shall be made when the placing of grout, in grout filled cells, is stopped for more than one hour. The construction joint shall be 12 mm below the top of the last course filled with grout.

Bond beams shall be continuous. The top of unfilled cells under horizontal bond beams shall be covered with metal or plastic lath.

When fresh masonry joins masonry that is partially or totally set, the contact surface shall be cleaned, roughened and lightly wetted.

Surfaces of the concrete on which the masonry walls are to be placed shall be roughened and cleaned, exposing the stone aggregate, and shall be flushed with water and allowed to dry to a surface dry condition immediately prior to laying the masonry units.

Where masonry unit cutting is necessary, all cuts shall be made with a masonry saw to neat and true lines. Masonry units with cracking or chipping of the finished exposed surfaces will not be acceptable.

Masonry shall be protected as specified for concrete structures in Section 90-8, "Protecting Concrete," of the Standard Specifications and these special provisions.

During erection, all cells shall be kept dry in inclement weather by covering partially completed walls. The covering shall be waterproof fabric, plastic or paper sheeting, or other approved material. Wooden boards and planks are not acceptable as covering materials. The covering shall extend down each side of masonry walls approximately 0.6-m.

Splashes, stains or spots on the exposed faces of the wall shall be removed.

10-1.44.5 TEST BORINGS

Test borings at Towers T2 and T3, and the South Anchorage shall consist of drilling test borings, taking samples, logging borings and furnishing test boring submittals to the Engineer.

Attention is directed to the "Order of Work," elsewhere in these special provisions.

Spoils from the test borings shall not fall into the surrounding seawater.

The "Soil and Rock Logging Classification Manual" is included in the "Materials Information" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

The Contractor shall drill test borings at or near the center of each load test pile location at the South Anchorage as shown on the plans, and one test boring at the center of each cast-in-drilled-hole concrete pile at Towers T2 and T3, as approved by the Engineer.

The Contractor shall notify the Engineer in writing not less than 10 working days in advance of drilling test borings.

All test borings shall be made under the site supervision of, the log of test borings stamped by, and the test boring submittal signed by a Geologist or Civil Engineer who is registered in the State of California and has at least five years of geotechnical engineering experience of deep foundations in both soil and rock.

Test borings shall be made by rotary drill methods and shall be at least 76 mm in diameter.

Test borings shall be drilled to a depth at least 3 m below the specified tip elevation for a given pile location at the South Anchorage.

For cast-in-drilled-hole concrete piling at Towers T2 and T3, test borings shall be drilled from the steel shell specified tip elevation down to 8 m below the steel shell specified tip elevation. The test boring may be drilled after the steel shell is installed.

Standard Penetration Tests (SPT) shall be made in all soil types and performed in accordance with ASTM D1586 in each test boring at 1.5-m maximum intervals and terminate when bedrock is encountered. Samples shall be taken at 4.5-m intervals in borings drilled at Tower T2 and at 3-m intervals in borings drilled at Tower T3. Soil classification and descriptions shall conform to the requirements for visual-manual procedures in ASTM D2488.

Bedrock shall be continuously cored with at least 90 percent core recovery. Rock shall not be logged from drill cuttings. Rock quality designation (RQD) shall be made taken at 1.5-m maximum intervals. Rock shall be cored using an outer and inner core barrel drilling system. The outer core barrel shall be fitted with either a diamond impregnated or polycrystalline drill bit and have an out side diameter of at least 76 mm. The split inner tube core barrel shall have an inside diameter of at least 50 mm.

Prior to removal from the split inner tube barrels and placement into core boxes, rock cores shall be photographed, and wrapped in a clear material to preserve moisture content and allow examination of cores. After core boxes are filled, and prior to removal from the drilling platform, rock cores shall be photographed. All rock core photographs shall be color, 127 mm x 178 mm, and labeled with the borehole number, sample elevation, scale, and date and time photographed.

The rock cores shall be retained in rock core boxes that are labeled with the job contract number, the pile location, and the sample elevation. Rock core boxes shall be stored on or near the job site at a location approved by the Engineer. The Contractor shall preserve and secure the rock core samples in a weather protected facility until notified by the Engineer. The Engineer will instruct the Contractor to dispose of the rock core samples in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, or the provisions in "Contaminated and Hazardous Materials" of these special provisions, or the Engineer will instruct the Contractor to transport the rock core samples to Translab at 5900 Folsom Boulevard, Sacramento, CA 95819.

Laboratory testing for strength will be conducted on both soil and rock samples recovered from borings, as approved by the Engineer. The tests shall include, but not be limited to unconfined compression test, Atterberg limit test, and point load test.

The log of test borings including the soil and rock classification shall conform to the document "Soil and Rock Logging Classification Manual: Field Manual," published by the Engineering Service Center, Caltrans, dated August 1995.

After completion of all test borings, the Contractor shall furnish to the Office of Structure Design (OSD), in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, a test boring submittal that includes rock cores, photographs of rock cores, a test boring report and the log of test borings.

All log of test borings shall be 559 mm x 864 mm in size. For initial review, 4 sets of drawings shall be submitted. Within 3 weeks after final approval of the test boring submittal, one set of the corrected prints on 90-g/m^2 (minimum) good quality bond paper, 559 mm x 864 mm in size, prepared by the Contractor shall be furnished to OSD.

Log of test borings shall show the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile on each sheet. The test boring/geotechnical subcontractor name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers. The following shall be shown on the log of test borings:

1. Stationing and offset of boring.
2. Northing and easting coordinates.
3. Reference elevation and datum.
4. Boring start and completion date.
5. Geotechnical notes and miscellaneous explanations.
6. Drill bit and sampler types and diameters.
7. Percent of core recovery and RQD.
8. Sample numbers.
9. SPT data.
10. Depth increments of borings.
11. Graphic log.
12. Soil classifications and descriptions.
13. Rock classifications and descriptions.
14. Log symbol legend.
15. Signature and seal of the Geologist or Civil Engineer.

The test boring report shall include the following:

1. Summary of drilling methods, drilling equipment, drill platforms, and any drilling difficulties encountered.
2. Location map of the surveyed position of the test borings relative to the existing pier and to the new pile locations (in California Coordinate System and bridge stationing).
3. Bore hole surveying notes.
4. Photographs of rock cores.
5. Copies of original daily drilling notes.

The Engineer will notify the Contractor in writing when a test boring submittal is complete and approved.

Within 5 working days at Towers T2 and T3, and 15 working days at the South Anchorage, of approving in writing the complete test boring submittal, the Engineer will supply the Contractor with written confirmation of, or revisions to, specified pile tip elevations, including specified tip elevations for both steel shell and rock socket, shown on the plans. Rock sockets shall not be drilled, and permanent steel shell and filled and unfilled steel casing shall not be fabricated or manufactured to length until written confirmation of, or revisions to, the specified pile tip elevations have been supplied by the Engineer. Should the Engineer fail to supply confirmation of or revision to specified pile tip elevations within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this delay, an extension of time commensurate with the delay in completion of the work thus caused will be granted as provided in Section 8-1.09, “Right of Way Delays,” of the Standard Specifications.

All materials utilized in making test boring shall be disposed of in accordance with the provisions in Section 7-1.13, “Disposal of Material Outside the Highway Right of Way,” of the Standard Specifications, or the provisions in “Contaminated and Hazardous Materials” of these special provisions.

Full compensation for making test borings, including drilling, sampling, logging and furnishing test boring submittals, and disposal of materials from test boring operations shall be considered as included in the contract price paid for piling of the type or class shown in the Engineer’s Estimate, and no separate payment will be made therefor.

10-1.45 PILING

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

The Foundation Geotechnical Report and cores from the test boring program obtained under separate contract are available to the Contractor for inspection at the Department of Transportation, Duty Senior's Desk, 111 Grand Avenue, Oakland, California, Telephone No. (510) 286-5209.

Attention is directed to "Earthwork," "Contaminated and Hazardous Materials," "Permits and Licenses," "Relations with California Regional Water Quality Control Board," "Relations with US Army Corps of Engineers," "Relations with Bay Conservation and Development Commission," "Relations with US Coast Guard," "Obstructions," "Sound Control," and "Water Pollution Control" of these special provisions.

Attention is directed to "Welding Quality Control" and "State-Furnished Materials" of these special provisions.

Attention is directed to "Public Safety," of these special provisions. Before performing any pile handling or pile installation operation at any location that is closer than the length of the pile being handled or installed to the edge of any area open to public traffic or public use, the Contractor shall submit to the Engineer, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, a detail plan of the measures that will be employed to provide for the safety of traffic and the public.

The second paragraph in Section 49-1.03, "Determination of Length," of the Standard Specifications is amended to read:

At the Contractor’s option, the Contractor may conduct additional foundation investigation, including installing and axial load testing additional non-production indicator piling. The Engineer shall approve locations of additional foundation testing. The Contractor shall notify the Engineer at least 5 working days prior to beginning additional foundation investigation.

Additional foundation investigation shall be completed prior to requesting revised specified pile tip elevations or modification to the installation methods specified herein. Revisions to specified tip elevations and modifications to the specified installation methods will be subject to the provisions of Section 5-1.14, "Cost Reduction Incentive."

Modification to the specified installation methods and specified pile tip elevation will not be considered at locations where lateral load demands control design pile tip elevations or when the plans state that specified pile tip elevation shall not be revised.

The pile structural capacity design is based on the nominal strength as defined in Caltrans Bridge Design Specifications (Article 8.1.3) or the nominal resistance as defined in the LRFD Bridge Design Specifications (Article 1.3.2.1). The nominal resistance of the pile, as shown on the plans, is the design capacity required to resist the factored axial load demands.

Indicator compression pile load testing shall conform to the requirements of ASTM Designation: D 1143. The acceptance criteria for compression pile load testing shall be as follows:

> The pile shall sustain the first compression test load applied which is equal to the nominal compression resistance, as shown on the plans, with no more than 13 mm total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of compression load testing.

Indicator tension pile load testing shall conform to the requirements of ASTM Designation: D 3689. The loading apparatus described as "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" shall not be used. The acceptance criteria for tension pile load testing shall be as follows:

> The pile shall sustain the first tension test load applied which is equal to the nominal tension resistance, as shown on the plans, with no more than 13 mm total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of tension load testing.

Indicator piling shall be removed in conformance with the requirements in Section 15-4.02, "Removal Methods," and the remaining holes shall be backfilled with earth or other suitable material approved by the Engineer.

For driven piling, the Contractor shall furnish piling of sufficient length to obtain both the specified tip elevation and design load shown on the plans or specified in the special provisions. For cast-in-drilled-hole concrete piling, the Contractor shall construct piling of such length to develop the compression nominal resistance and to obtain the specified tip elevation shown on the plans or specified in the special provisions.

The revised specified pile tip elevation shall not be above that required for lateral loading as shown on the plans.

The wall thickness of the steel shells for cast-in-steel-shell concrete piling may be increased at the Contractor's option. The wall thickness for permanent steel shells at Towers T2 and T3 shall not be increased.

The Contractor shall not modify the length of the South Anchorage and Towers T2 and T3 piles.

The fifth paragraph in Section 49-1.04, "Load Test Piles," of the Standard Specifications is amended to read:

Load test anchorages in piles used as anchor piles shall conform to the following requirements:

High strength threaded steel rods shall conform to the provisions for bars in Section 50-1.05, "Prestressing Steel," except Type II bars shall be used.

High strength steel plates shall conform to the requirements in ASTM Designation: A 709, Grade 50.

Anchor nuts shall conform to the provisions in the second paragraph in Section 50-1.06, "Anchorages and Distribution."

The eighth, ninth and tenth paragraphs in Section 49-1.04, "Load Test Piles," of the Standard Specifications are amended to read:

Should the Engineer fail to complete the load tests within the time specified in the special provisions and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in load testing of piles, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays."

The Contractor shall furnish labor, materials, tools, equipment, and incidentals as required to assist the Engineer in the installation, operation and removal of State-furnished steel load test beams, State-furnished jacks,bearing plates, drills, and other test equipment. This work will be paid for as extra work as provided in Section 4-1.03D.

Load test piles shall be installed using the same procedures that are to be used for installation of production piles.

The first and second paragraphs in Section 49-1.05, "Driving Equipment," of the Standard Specifications are amended to read:

49-1.05 Driving Equipment.—Driven piles shall be installed with impact hammers that are approved in writing by the Engineer. Impact hammers shall be steam, hydraulic, air, or diesel hammers. Impact hammers shall develop sufficient energy to drive the piles at a penetration rate of not less than 3 mm per blow at the specified bearing value.

Vibratory hammers shall not be used for installation of piles, unless otherwise shown on the plans or specified in the special provisions.

Hammers with an external combustion engine that are not single action, shall have a transducer that records ram velocity.

Double acting diesel hammers with internal combustion engines shall have a transducer that records bounce chamber pressure.

For hammers with no visual way of observing the ram stroke, a printed readout showing hammer energy during driving operation shall be provided to the Engineer by the Contractor.

The fifth paragraph in Section 49-1.05, "Driving Equipment," of the Standard Specifications is deleted.

The use of followers will be permitted for NPS 30 cast-in-steel shell concrete piling for piles at the South Anchorage and Pier P1.

At the option of the Contractor, vibratory hammers may be used to install cast-in-steel shell concrete piling at Bent 7 Crockett Viaduct to elevation _-9.4 .

At the option of the Contractor, vibratory hammers, impact hammers, torque or oscillation equipment may be used at Towers T2 and T3 to install permanent steel shells of cast-in-drilled-hole concrete piling to the pile tip elevations listed in the following table:

Location	Pile Location	Pile Tip Elevation (m)
Tower T2	East Footing	-35.0
	West Footing	-34.0
Tower T3 (East Footing)	EE1	-38.5
	EE2	-36.5
	EE3	-34.0
	EW1	-38.0
	EW2	-35.5
	EW3	-33.0
Tower T3 (West Footing)	WE1	-37.0
	WE2	-34.5
	WE3	-32.5
	WW1	-36.5
	WW2	-34.5
	WW3	-32.0

At Tower T2, below the pile tip elevation shown in the above table, impact hammers shall be used to install permanent steel shells to the specified tip elevation.

At Tower T3, below the pile tip elevation shown in the above table, torque or oscillation equipment may be used to install permanent steel shells into rock. The steel shell shall be installed to a minimum of 600 mm below the top of rock elevation, or to the steel shell specified tip elevation, whichever is deeper.

For dolphin piles near Tower T3, impact hammers, torque or oscillation equipment may be used to install the piles into rock.

Procedures which cause damage to the pile will not be permitted. Should damage to the pile occur at Towers T2 and T3, as determined by the Engineer, the pile shall be repaired at the Contractor's expense.

Difficult pile installation is anticipated due to the presence of soft bay mud overlying dense soils, caving soils, hazardous and contaminated materials, serpentine materials, large tidal flow fluctuation, high ground water, cobbles and boulders, subsurface concreteand timber debris, the requirements of pile embedment into rock, and sound control

Additional difficulty is anticipated for installation of the piles at Towers T2 and T3 due to the presence of caving soils at the rock socket, intensely fractured rock that may cause loss of hydrostatic head in the rock socket, rocky fill at the east footing of Tower T3, expansive soils, high winds, fog, exceptionally fast currents subsurface timber debris from abandoned docks, trestles, moorings, dolphins and fenders, riprap, the requirements of permanent steel shell embedment into rock, the requirements of cleaning the bottom of the rock socket, and horizontal and vertical tolerances of the pile.

It is anticipated that piles will experience significant set-up.

The second paragraph of Section 49-4.04, "Steel Shells," of the Standard Specifications shall not apply.

The third paragraph in Section 49-4.04, "Steel Shells," of the Standard Specifications is amended to read:

Steel shells shall conform to the provisions for steel pipe piles specified in Section 49-5, "Steel Piles."

Section 49-5.01, "Description," of the Standard Specifications is amended to read:

49-5.01 Description.—Steel piles shall include structural shape piles and pipe piles. Structural shape steel piles shall be of the rolled section shown on the plans or of the section specified in the special provisions and shall be structural steel conforming to the specifications of ASTM Designation: A 36/A 36M, or at the option of the Contractor, structural steel conforming to the specifications of ASTM Designation: A 572/A 572M.

Steel pipe piling shall conform to the following requirements:

1. Piles shall be of the nominal diameter and the nominal wall thickness as the pipe piles shown on the plans unless otherwise specified in the special provisions.

2. The carbon equivalency (CE) as defined in AWS D 1.1, Section XI5.1, shall not exceed 0.45.

3. The sulfur content shall not exceed 0.05 percent.

4. Piles shall conform to any additional requirements in the special provisions, including but not limited to, tolerances for diameter, edge alignment, end match marking, roundness, and straightness, that are required in order to conform with steel pile splice welding and welding inspection provisions.

5. Steel pipe pile seams shall be complete penetration welds and shall conform to the requirements of AWS D1.1 and any additional amendments to AWS D1.1 listed herein and in the special provisions. Incomplete penetration welds and defective welds of steel pipe piles shall be repaired or restored to achieve complete joint penetration groove welds.

6. Steel pipe piles that are less than 360 mm in diameter shall conform to the specifications of ASTM Designation: A 252, Grade 2 or 3, and steel pipe piles that are 360 mm and greater in diameter shall conform to the specifications of ASTM Designation: A 252, Grade 3, as amended by the above requirements.

Steel piles shall not be joined by welded lap splicing.

The manufacturer or fabricator of steel piling shall furnish a Certificate of Compliance stating that the piling being supplied conforms to these specifications and to the special provisions. The Certificate of Compliance shall include test reports for tensile, chemical, and any specified nondestructive tests. Samples for testing shall be taken from the base metal, steel, coil or from the manufactured or fabricated piling.

Section 49-5.02, "Splicing," of the Standard Specifications is amended to read:

49-5.02 Splicing.—Steel pile splices shall conform to the requirements of AWS D 1.1 and the special provisions. Structural shape steel piling splices shall be complete joint penetration groove welds. Steel pipe pile splices that are made at a permanent manufacture or fabrication facility, and that are made prior to furnishing the Certificate of Compliance shall be complete penetration welds. Steel pipe pile splices that are made in the field shall be complete joint penetration groove welds.

Ends of steel pipe piling to be spliced that have been damaged during driving shall be removed to a sound and uniform section conforming to the tolerances for diameter, edge alignment and roundness required to meet the steel pile splice welding requirements. Pipe ends shall be field cut using automated guided cutting equipment. Manual flame cutting shall not be used.

Steel shells shall be installed open-ended and no internal plates other than weld backup plates shall be used, except shear ring bars for the permanent steel shells of cast-in-drilled-hole concrete piling and cast-in-steel shell concrete piling at the South Anchorage.

The axis of the steel shell for cast-in-steel shell concrete piling shall not deviate from plumb by more than 6 mm per one meter of length. The axis of the steel shell and the rock socket for cast-in-drilled-hole concrete pile shall not deviate from plumb by more than 19 mm per 3050 mm of length.

Attention is directed to the assumed tower footing construction sequence shown on the plans regarding pile alignment and guidance through precast tower footing form.

For steel shells of cast-in-drilled-hole concrete piling and cast-in-steel shell concrete piling, the Contractor shall provide steel shells sufficiently long to contain the slurry, water, material resulting from drilling and pile clean out, and excess concrete. For steel shells of cast-in-steel shell concrete piling, the Contractor may use temporary conduits. If a temporary steel conduit is used, the connection between the temporary conduit and the steel shell shall be watertight.

In addition to the provisions in Section 49-1.05, "Driving Equipment," of the Standard Specifications, should obstructions to driving be encountered, the Contractor shall provide special driving tips or heavier pile sections, or shall predrill, or take other measures to prevent damage to the pile during driving. Full compensation for providing special tips, heavier sections, or for predrilling or employing other measures to prevent damage to the piles shall be considered as included in the contract price paid per unit for drive pile of the size and type shown on the plans and no additional compensation will be allowed therefor.

Hardened steel driving tips to achieve specified penetration are mandatory at Towers T2 and T3, the South Anchorage, and Pier P1. At other locations, they may be used by the Contractor to maintain integrity of the end of the steel shells.

At the Contractor's option and with the approval of the Engineer, the hardened steel driving tip detail shown on the plans may be modified. The outside diameter of the driving tip shall not be greater than the outside diameter of the pile.

Jetting And Drilling

Jetting to obtain the specified penetration in conformance with the provisions in Section 49-1.05, "Driving Equipment," of the Standard Specifications shall not be used for any pile.

At Towers T2 and T3, the Contractor may drill a hole with a diameter 1000 mm less than the inside diameter of the permanent steel shell to 3 meters below the steel shell tip, but not beyond the specified tip elevation, to advance the permanent steel shell. The space between the side of the hole and the inner surface of the steel shell shall not be greater than 300 mm. Drilling of holes shall be performed under a head of slurry equal to 3 meters maximum above mean sea level.

Holes drilled to advance the permanent steel shell shall match the plumb tolerance of the steel shell specified herein.

Piles may be driven in undersized drilled holes through fill only to 1.0 meter below the bottom of footing elevation at Pier P1, and to 0.5 meters below the bottom of footing elevation at the South Anchorage.

In addition to driving, it is anticipated that drilling through the center of open ended steel shells for cast-in-steel-shell concrete piling to obtain the specified penetration may be necessary. The diameter of the drilled hole shall be less than the inside diameter of the piling. Equipment or methods used for drilling holes shall not cause quick soil conditions or cause scouring or caving of the hole. Drilling shall not be used within 0.6 meters of the pile tip and the specified tip elevation for the dolphin piles at Tower T2 and fender piles at Tower T3. Drilling shall not be used within 1.5 meters of the pile tip and the specified tip elevation for the dolphin piles at Tower T3 when the pile is above rock. In the rock, drilling will be permitted 0.6 meters beyond the pile tip, but not beyond the specified tip elevation, provided the drilling diameter is 200 mm less than the pile inside diameter. Water head shall be maintained within the steel shells to prevent blowout.

The Contractor may drill through the center of open ended steel shells for cast-in-steel-shell concrete piling to obtain the specified penetration at Bent 7 Crockett Viaduct, South Anchorage and Pier P1. The diameter of the drilled hole shall be less than the inside diameter of the piling. Equipment or methods used for drilling holes shall not cause quick soil conditions or cause scouring or caving of the hole. At the South Anchorage, drilling may be used to 1.0 meter beyond the pile tip, but not beyond the specified tip elevation for tension shown on the plans, for all piles except piles T4 through T14. Drilling may be used at South Anchorage piles T4 through T14 to 1.0 meter beyond the pile tip, but not beyond the specified tip elevation. At Bent 7, Crockett Viaduct, drilling may be used to 1.0 meter beyond the pile tip, but no drilling shall be allowed within 5 meters of the specified tip elevation.

Full compensation for disposing of material resulting from drilling shall be considered as included in the contract unit price paid for drive pile and no additional compensation will be allowed therefor.

Driving System and Steel Shell Installation Submittal--Prior to installing driven piling and permanent steel shells for cast-in-drilled-hole concrete piles, the Contractor shall provide a driving system submittal, including driveability analysis, in accordance with provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. A submittal shall be made for each control location shown below. All proposed driving systems (i.e., each hammer that may be brought onto the site) shall be included in the submittal.

Bridge Number	Control Location
28-0352L	Pier P1-East footing
	Pier P1-West footing
	South Anchorage - 28 pile groups, A through BB, as shown on the plans
	Tower T2
	Dolphin (near Tower T3)
	Fender (near Tower T3)
28-0367L	Bent 7 Crockett Viaduct

The driving system submittal shall contain an analysis showing that the proposed driving systems will install piling to: the nominal resistance and design tip elevation at Bent 7 Crockett Viaduct, Pier P1 and the South Anchorage; the nominal resistance and design tip elevation for the permanent steel shells at Tower T2; and the nominal resistance and specified penetration into rock at the Dolphin and Fender locations. Driving systems shall generate sufficient energy to drive the piles with stresses not more than 95 percent of the specified yield strength of the steel pile or unfilled steel shell. Submittals shall include the following:

1. Complete description of soil parameters used, including soil quake and damping coefficients, skin friction distribution, ratio of shaft resistance to nominal compression resistance, any assumptions made regarding the formation of soil plugs, and any assumptions made regarding drilling through the center of open ended steel shells.
2. List of all hammer operation parameters assumed in the analysis, including fuel settings, stroke limitations, and hammer efficiency.
3. Driveability studies that are based on a wave equation analysis using a computer program that has been approved by the Engineer. Driveability studies shall model the Contractor's proposed driving systems, including the hammers, capblocks, and pile cushions, as well as determine driving resistance and pile stresses for assumed site conditions. Separate analyses shall be completed at elevations above the specified tip elevations where difficult driving is anticipated.
   Studies shall include plots for a range of pile compression capacities above and below the nominal compression resistance shown on the plans. Plots shall include the following:
   a. Pile compressive stress versus blows per 0.30m.
   b. Pile tensile stress versus blows per 0.30m.
   c. Nominal compression resistance versus blows per 0.30m.

   When the driveability analysis hammers indicate that open ended steel shell penetration rates are less than 0.30 meters per 200 blows and the driving stresses will exceed 80% of the specified yield strength of the pipe and steel shell, the study shall include assumptions for drilling through the center of open ended pipe piles and steel shells.
   When the driveability analysis hammers at the Dolphin and Fender control locations indicate an increase in driving resistance of at least 50 percent over one meter or less of the pile length, the study shall define the top of rock at the bottom of this one meter length of pile.
4. Copies of all test results from any previous pile load tests, dynamic monitoring, and all driving records used in the analyses.
5. Completed "Pile and Driving Data Form," which is shown elsewhere in these special provisions.
6. Mitigation plan for overcoming pile set-up.

Prior to installing permanent steel shells for cast-in-drilled-hole concrete piles using torque or oscillation equipment at Tower T3, the Contractor shall provide an installation system submittal in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

The steel shell installation submittal shall contain a description of the method of installation and equipment required to install the steel shell to the specified tip elevation. The Contractor shall install the steel shell by vibrating or twisting the shell. Submittals shall include the following:

1. Complete description of the proposed method of steel shell installation, including description of soil parameters used.
2. List of all equipment needed to install the steel shell, including rated energy.
3. Analysis showing that the equipment and proposed method of installation will install the steel shell to the specified tip elevation without overstressing the shell in tension, compression or torsion.
4. Calculations to verify energy from the installation equipment reaches the steel shell tip.
5. Methods to maintain plumb tolerances of the steel shell while installing.
6. Methods to support installation equipment and anchor the equipment to the work platform, including calculations to show platform is adequate to resist forces from installation equipment.

The driving system and steel shell installation submittal shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow the Engineer 15 working days to review a driving system or steel shell installation submittal after a complete set has been received, as determined by the Engineer, and prior to installing piling. Should the Engineer fail to complete his review within the time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in the driving system submittal review, the delay will be considered a right of way delay as specified in Section 8-1.07, “Liquidated Damages,” in the Standard Specifications.

The Contractor shall use the driving system and installation methods described in the approved driving system and steel shell installation submittal for a given control location. Any change in hammers, equipment or methods from those submitted and approved by the Engineer shall also meet the requirements for driving system and steel shell installation submittals. Revised and new driving system and steel shell installation submittals shall be approved by the Engineer prior to using corresponding driving systems and steel shell installation methods on production piling. The Contractor shall allow the Engineer 15 working days to review each revised and each new driving system and steel shell installation submittal after a complete set has been received, as determined by the Engineer.

Approval of pile driving equipment and steel shell installation method shall not relieve the Contractor of his responsibility to drive piling and install steel shells free of damage to the specified penetration.

Full compensation for driving system and steel shell installation submittals shall be considered as included in the contract price paid for piling of the type or class shown in the Engineer’s Estimate and no additional compensation will be allowed therefor.

Load Test Piles

The Contractor shall notify the Engineer in writing not less than 10 working days in advance of driving the piles to be load tested at a given location at the South Anchorage and Bent 7 Crockett Viaduct.

The third sentence of paragraph 7 of Section 49-1.04 "Load Test Piles," of the Standard Specifications is deleted.

The Contractor shall not install load test piles at more than one test location at a time. The State will monitor and perform static load tests at one location at a time. The Contractor shall submit a schedule to the Engineer listing the order that the test locations will be installed.

One load test pile shall remain in place after load testing and dynamic monitoring to be load tested and dynamically monitored again after 5 working days in order to investigate the effects of soil set-up.

Before the remaining piles at the control locations listed in the following table are cast, cut to length or driven, load testing of each load test pile shown on the plans for the corresponding control location shall be completed:

Bridge	Load Test Pile Location, as shown on the plans	Control Locations, as shown on the plans
Carquinez (South Anchorage)	C4 and C16	A through G
	G6 and G14	H through L
Crockett Viaduct (Bent 7)	Bent 7	Bent 7 footing

The remaining South Anchorage piles of control locations M through BB, as shown on the plans, shall not be cast, cut to length or driven until load testing of each load test pile is complete.

The bottom of footing excavation shall be dewatered and made level before pile load testing. The excavation shall be kept dewatered during load testing.

Unless otherwise specified or shown on the plans, steel plates welded to the load test and anchor piling shall conform to the requirements in ASTM Designation: A 709/A 709M, Grade 50, and shall be welded to the piling in conformance with the requirements in AWS D1.1.

Pipe, couplings and fittings shall be commercially available materials of the types and ratings shown on the plans.

Dynamic Monitoring

Driven test piles, anchor piles and index piles at the South Anchorage and driven test piles,and anchor piles at Bent 7 Crockett Viaduct will be monitored during the final 8 m of driving for dynamic response to the driving equipment. Monitoring will be done by State forces using State-furnished dynamic pile analyzer monitoring instruments.

The Contractor shall install load test and anchor piles for control locations A through G, and control locations H through L, prior to installing index piles for a given control location.

In addition, the Engineer will determine which piles will receive dynamic monitoring from each control location listed in "Driving System Submittal." Piles to be dynamically monitored shall be made available to State forces 2 working days prior to driving. They shall be safely supported a minimum of 150 mm off the ground in a horizontal position on at least 2 support blocks. The pile shall be positioned so that State forces have safe access to the entire pile length and circumference for the installation of anchorages and control marks for monitoring. The Contractor shall rotate the piles on the blocks as directed by the Engineer.

Piles to be dynamically monitored shall be prepared and driven in the following sequence:

1. Prior to driving, the Contractor shall rotate and align the pile in the driving leads as directed by the Engineer
2. The Contractor shall temporarily suspend driving operations for approximately 30 minutes when the pile tip is 8 m above the elevation to which the tip is required to be finally driven.
3. During the 30 minute suspension, the Contractor shall bolt the 0.5-kg instrument package securely to plugs or expansion anchors previously installed in the pile by the State. The Contractor shall also connect electrical cables to the instrument package as directed by the Engineer.
4. Driving operations shall resume as directed by the Engineer. Driving operations shall be suspended approximately 0.5-m above the specified tip elevation, as directed by the Engineer.
5. The Contractor shall remove the cables and instrument package from the pile and deliver them to the Engineer.
6. At least 24 hours after initial installation, the Contractor shall install the instrument package on the pile and attach the cables and resume driving the pile to the specified tip elevation, as directed by the Engineer.
7. The Contractor shall remove the cables and instruments from the monitored pile and deliver them to the Engineer.

The Contractor shall be responsible for any damage to the State's cables and instruments caused by the Contractor's operations, and shall replace damaged cables or instruments in kind.

Wave Equation

The second paragraph of Section 49-1.03, "Determination of Length," and paragraphs 3 and4 of Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications shall not apply to the pile types at the control locations listed herein. The Engineer will conduct a penetration and bearing analysis in conjunction with pile load testing and dynamic monitoring of the piles at these locations and develop bearing acceptance criteria curves for these piles. Penetration and bearing analyses will be based on a wave equation analysis.

For South Anchorage control locations A through G, the Contractor shall allow the Engineer 35 working days to perform the load tests, complete dynamic monitoring, revise specified tip elevations and to provide the bearing acceptance criteria curves for all control locations. Day one of 35 shall be the first day after the load test, anchor, and index piles have been installed at all control locations.

For South Anchorage control locations H through L, the Contractor shall allow the Engineer 35 working days to perform the load tests, complete dynamic monitoring, revise specified tip elevations and to provide the bearing acceptance criteria curves for all control locations. Day one of 35 shall be the first day after the load test, anchor, and index piles have been installed at all control locations.

After the Engineer provides bearing acceptance criteria curves for South Anchorage control locations A through L, the Contractor shall install index piles for South Anchorage control locations M through BB.

For Bent 7 Crockett Viaduct, the Contractor shall allow the Engineer 35 working days to perform the load tests, complete dynamic monitoring, revise specified tip elevations and to provide the bearing acceptance criteria curves for a given control location. Day one of 35 shall be the first day after the load test and anchor piles have been installed at that same control location.

For the remaining control locations listed in “Driving System Submittal,” the Contractor shall allow the Engineer 15 working days to complete dynamic monitoring, revise specified tip elevations and to provide the bearing acceptance criteria curves for a given control location. Day one of 15 shall be the first day after the index piles have been installed at that same control location.

Should the Engineer fail to provide the bearing acceptance criteria curves for production piles within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in providing the bearing acceptance criteria curves, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.Production piles, other than load test, anchor, and index piles, and monitored piles at control locations, shall not be installed until the bearing acceptance criteria curves for piles within the corresponding control location have been provided by the Engineer.

Load test and anchor piles shall be redriven to the bearing acceptance criteria and become part of the completed structure.

10-1.46 DRILLED HOLES

Holes for steel soldier piles shall be drilled into natural foundation materials at the location shown on the plans and shall conform to the provisions in Section 49, "Piling," of the Standard Specifications and these special provisions.

Foundation recommendations are included in the "Materials Information" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Drilled holes shall be accurately located and shall be straight and true. When the piles are plumbed and aligned, the steel piles shall be at least 25 mm clear of the sides of the hole for the full length of the hole to be filled with concrete backfill and lean concrete backfill. Holes which do not provide the clearance around steel piles shall be reamed or enlarged at the Contractor's expense.

Temporary casings or tremie seals shall be furnished and placed where necessary to control water or to prevent caving of the hole.

Difficult drilling is anticipated due to the presence of hard rock, caving soils, high ground water, riprap, subsurface timber and concrete debris, and the requirements of pile embedment into rock.

Loose materials existing at the bottom of the hole after drilling operations have been completed shall be removed before placing the pile.

Materials resulting from drilling holes shall be disposed of as provided in Section 19-2.06, "Surplus Material," of the Standard Specifications.

Drilling mud or chemical stabilizers shall not be used. Surface water shall not be permitted to enter the hole and all water in the hole shall be removed before placing concrete therein.

Casing, if used in drilling operations, shall be removed from the hole as concrete is placed therein. The bottom of the casing shall be maintained not more than 1500 mm nor less than 300 mm below the top of the concrete during casing withdrawal and concrete placing operations. Separation of the concrete during withdrawal operations shall be avoided by hammering or otherwise vibrating the casing. The methods used to withdraw temporary casings shall preclude contamination of the concrete and commingling of the soil and concrete or of any ground water and concrete.

The contract price paid per meter for drilled hole of the diameters listed in the Engineer's estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in drilling holes for soldier piles, including disposing of the material resulting from drilled holes, dewatering, casing holes and removing casing, and providing tremie seals, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

FENDER PILE PROTECTIVE COATING.--The NPS 16 steel pipe piles at the fenders, NPS 20 pipe sleeves, and structural tubing and connection plates shall be painted with flame sprayed plastic as shown on the plans and conforming to these special provisions

Where flame sprayed plastic is shown on the plans, the exposed exterior surfaces and exterior surfaces below ground or water shall be cleaned and painted with a coat of flame sprayed plastic, and the remaining new metal surfaces shall be cleaned and painted with waterborne inorganic zinc coating. The waterborne inorganic zinc coating will not be required under flame sprayed plastic.

A qualified representative of the manufacturer of the flame sprayed plastic shall be present during the first 3 days of flame sprayed plastic application and shall be available for advice during the remaining time of flame sprayed plastic application.

Blast cleaning or application of flame sprayed plastic shall conform to the requirements for blast cleaning or application of solvent-borne paint in Section 59-1.02, "Weather Conditions," of the Standard Specifications, except the maximum surface temperature restrictions shall be in accordance with these special provisions.

Piling, pipe sleeves, structural tubing and connection plates surfaces to be painted with flame sprayed plastic shall be blast cleaned and painted with the flame sprayed plastic at the job-site.

CLEANING.--The surfaces to be cleaned and painted shall be dry blast cleaned in accordance with the provisions of Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the Steel Structures Painting Council. For surfaces coated with waterborne inorganic zinc coating, blast cleaning shall leave a dense, uniform, angular, anchor pattern of no less than 40 µm as measured in accordance with ASTM Designation: D 4417, and for surfaces to be coated with flame sprayed plastic, blast cleaning shall leave a dense, uniform, angular, anchor pattern of between 50 µm and 75 µm.

Flame sprayed plastic shall be applied in one continuous operation within 8 hours after blast cleaning. Any seams in the flame sprayed plastic shall be horizontal and fused completely together.

Surfaces to be coated with flame sprayed plastic shall receive a flame sprayed plastic which consists of thermoplastic powder, pigments, and other additives which are melt blended by the manufacturer specifically for application through a propane gas flame.

The thermoplastic powder shall be an ethylene methacrylic acid copolymer (EMA), or at the Contractor's option, ethylene acrylic acid copolymer (EAA) and shall have the following properties:

Property	EMA Requirement	EAA Requirement	ASTM Designation
Melt Index, at 190°C and 2.16 Kg load, g/10 minutes	32 ± 3	20 ± 3	D 1238
Density, g/cm^3	0.930 to 0.940	0.940 to 0.970	D 792
Hardness, Shore D	48 ± 2	54 ± 2	D 2240

The color of flame sprayed plastic shall closely match Federal Standard 595B No. 26408.

Prior to application of flame sprayed plastic, the Contractor shall furnish to the Transportation Laboratory a representative one pound sample from each batch of pre-blended flame sprayed plastic material. Each sample shall be packaged in an air tight container identified with the manufacturer's name and the manufacturer's batch number.

Flame spray equipment shall be operated in accordance with the manufacturer's instructions.

Surfaces to receive flame sprayed plastic shall be preheated to between 77°C and 88°C immediately prior to coating. The Contractor at his expense shall verify the surface temperature using an infrared thermometer.

The minimum thickness of flame sprayed plastic shall be 375 µm.

The coating of flame sprayed plastic shall be free of pinholes when tested with a low voltage, 67.5 volts, wet sponge holiday detector. The coating of flame sprayed plastic shall have a minimum adhesion to steel of 7 MPa when measured at no more than 4 locations on each pile in accordance with ASTM Designation: D 4541. The locations of pinhole and adhesion tests will be determined by the Engineer. The Contractor at his expense shall: (1) verify compliance with the pinhole and adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Surfaces of piling, sleeves, tubing and plates coated with flame sprayed plastic shall be protected from damage. Bare metal slings or chokers shall not be used. Procedures which cause damage to the coating will not be permitted. Should damage to the coating occur, as determined by the Engineer, the coating shall be repaired at the Contractor's expense.

SEISMIC INSTRUMENTATION.--Seismic instrumentation shall be placed as shown on the plans.

Attention is directed to "Seismic Monitoring Electrical System" of these special provisions.

Pile-Type Downhole Installations.—The Contractor shall notify the Engineer 2 weeks prior to installing the piles to be instrumented in order for the California Division of Mines and Geology (CDMG) personnel to be on site for the installation of the 4 inch steel downhole casings. CDMG will provide the specially formed sealed cap assembly (Bishops Hat) for the bottom of the casing. CDMG will require assistance in transferring the "Bishops Hat" orientation mark to the top (exposed end) of the casing after the pipe is assembled and joints are tack/spot welded. The 4 inch steel casings shall be secured into the rebar cage of the pile so that it is plumb to within one degree when installed. The downhole casings shall be laterally supported through the pile.

Access and Contractor Assistance.—The Contractor shall provide CDMG personnel means and equipment to safely access and perform work at all recorder, sensor and antenna locations after all Contractor-installed equipment, conduit and cabling is completed, including the transportation of equipment on the job site, traffic control and movement of stored materials or parked vehicles where necessary. Access is for the purpose of installation, operational testing and to perform any necessary system troubleshooting and repair.

CAST-IN-DRILLED-HOLE CONCRETE PILES

Cast-in-drilled-hole concrete piling shall conform to the provisions in Section 49-4, "Cast-In-Place Concrete Piles," of the Standard Specifications and these special provisions.

Cast-in-drilled-hole concrete piles at Towers T2 and T3 shall consist of permanent steel shells with hardened steel driving tips installed into bedrock with drilled or cored rock sockets and reinforced concrete fill as shown on the plans.

Temporary casings shall not be used.

The sixth sentence of the sixth paragraph of Section 49-4.03, "Drilled Holes," of the Standard Specifications is amended to read:

Casing may be vibrated or hammered when required to assist in removal of the casing from the hole, to prevent lifting of the reinforcement, and to prevent concrete contamination.

Materials

Cast-in-drilled-hole concrete piles, from the specified tip up to the lower construction joint shown on the plans, shall be constructed by excavation and depositing concrete under slurry.

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 90 mm. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 400 kg of cement per cubic meter.

The Contractor may use either the 12.5-mm maximum combined aggregate grading or the 9.5-mm maximum combined aggregate grading. The grading requirements for the 12.5-mm maximum coarse aggregate and the 9.5-mm maximum coarse aggregate are shown in the following table:

	Percentage Passing Primary Aggregate Nominal Size			
	12.5 mm x 4.75 mm		9.5 mm x 2.36 mm	
Sieve Sizes	Operating Range	Contract Compliance	Operating Range	Contract Compliance
19 mm	100	100		
12.5 mm	82 - 100	80 - 100	100	
9.5 mm	X ± 15	X ± 22	X ± 15	X ± 20
4.75 mm	0 - 15	0 - 18	0 - 25	0 - 28
2.36 mm	0 - 6	0 - 7	0 - 6	0 - 7

In the table above, the symbol X is the gradation which the Contractor proposes to furnish for the 9.5-mm sieve size.

The gradation proposed by the Contractor for the 12.5-mm x 4.75-mm primary aggregate or for the 9.5-mm x 2.36-mm primary aggregate shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Sizes	Limits of Proposed Gradation
12.5 mm x 4.75 mm	9.5 mm	40 - 78
9.5 mm x 2.36 mm	9.5 mm	50 - 85

The combined aggregate grading for the 12.5-mm x 4.75-mm primary aggregate nominal size or for the 9.5-mm x 2.36-mm primary aggregate nominal size shall be within the following limits:

Grading Limits of Combined Aggregate		
	Percentage Passing	
Sieve Sizes	12.5-mm Max.	9.5-mm Max.
19 mm	100	100
12.5 mm	90 - 100	90 - 100
9.5 mm	55 - 86	50 - 100
4.75 mm	45 - 63	45 - 63
2.36 mm	35 - 49	35 - 49
1.18 mm	25 - 37	25 - 37
600 µm	15 - 25	15 - 25
300 µm	5 - 15	5 - 15
150 µm	1 - 8	1 - 8
75 µm	0 - 4	0 - 4

Construction

The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-drilled-hole concrete piling and at least 10 working days prior to constructing piling. The plan shall include complete description, details, and supporting calculations as listed below:

Requirements for all cast-in-drilled hole concrete piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling methods and equipment for rock socket, including type and suitability of the drill tip, and calculations showing capacity of equipment to perform the work.
3. Methods and equipment for steel shell installation, including calculations showing capacity of equipment to perform the work.
4. Plan view drawing of pile showing reinforcement and inspection pipes, if required.
5. Methods for placing, positioning and supporting bar reinforcement, including calculations.
6. Methods and equipment for accurately determining the depth of concrete, including sounding methods for continuously monitoring the top of the concrete surface and for determining the embedment of the tip of the tremie during concrete placement, and the actual and theoretical volume placed.
7. Support system for inspection pipes and seismic instrumentation, including methods to secure pipes in place and to verify pipes are straight and clear for their entire length.
8. Methods and equipment for roughening the surface of the rock socket hole if core barrel drilling techniques are used.
9. Methods to prevent disturbing the foundation material surrounding the rock sockets, and time required to complete excavation.
10. Methods to remove concrete at the lower construction joint.
11. Methods for maintaining the plumb tolerance of permanent steel shells when obstructions are encountered.
12. Drill pattern of piles.
13. Methods to confirm penetration of the steel shell into rock.
14. Methods and equipment for cleaning the rock socket.
15. Methods and equipment for cleaning steel shell, including shear rings.
16. Storage system for spoils resulting from continuous pile installation, including calculations showing storage capacity to avoid disruption of operations.
17. Methods and equipment for separating rock drill cuttings from slurry.
18. Procedures for avoiding worker fatigue during continuous construction.

Additional requirements when concrete is placed under slurry:

19. Concrete batching, delivery, and placing systems including time schedules and capacities therefor. Time schedules shall include the time required for each concrete placing operation at each pile.
20. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
21. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
22. Slurry testing equipment and procedures.
23. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
24. Slurry agitating, recirculating, and cleaning methods and equipment.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a batch to be tested. The test batch shall be produced and delivered to the job under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow testing in conformance with California Test 533. Depositing of test batch concrete under slurry will not be required. The test batch shall demonstrate that the proposed concrete mix design achieves both the specified nominal penetration and a penetration of at least 50 mm after twice the time required for each concrete placing operation at each pile, as submitted in the placing plan, has elapsed. The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Upon completion of testing, the concrete shall be disposed of in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

All materials and equipment needed for cleaning the drilled hole and the steel shell, for placement of concrete and reinforcing steel, and for roughening the sides of the rock socket if core barrel drilling is used, shall be on hand at the job site before drilling of the hole is begun. Concrete placement shall not begin until the Engineer has approved the final clean-out of the drilled hole and the steel casing surfaces.

Seawater may be used within the steel shell during installation and cleaning, and during drilling and cleaning of the rock socket prior to concrete placement.

Permanent Steel Shells.—State-furnished permanent steel shell segment lengths provided are shown in the following table:

Segment Length, mm	Number of Segments Required
18,000	24
3000	2
4000	2
5000	2
6000	1
7000	3
8000	2

The steel shell edges of the state-furnished piles are square. The piles will be stored at the following location. The location has marine and truck access.

Transbay Steel Corporation
1025 Kaiser Road
Napa, California
94558

The piles will be available for pick up on or after March 15, 2000. At least three weeks prior to picking up the piles from the above storage site the Contractor shall provide written notification to the Engineer of the Contractor's intent to pick up the piles. Such notification shall be given no later than March 1, 2000 and piles shall be picked up no later than March 22, 2000. If the Contractor picks up the piles later than March 22, 2000, payment to the Contractor for install state-furnished permanent steel shell shall be reduced $500 per day for every day pick up of state-furnished pile is delayed after March 22, 2000.

Cleaning Out Steel Shells.—Care shall be taken during cleanout of the steel shells to prevent disturbing the material surrounding the shell. Equipment or methods used for cleanout shall not cause blow-ins, quick soil conditions, scouring, or caving around or below the tip of the steel shells. The use of water jets for cleaning the sides of the steel shell and air lifts for cleaning out the steel shell shall be subject to the approval of the Engineer. Water jets shall not be used within 3 m of the tip of the steel shell.

Cleanout shall be performed under a head of slurry equal to 3 meters maximum above mean sea level. Cleanout below a level of 2 pile diameters above the position of the bottom of steel shell shall be carried out using a head of slurry as specified herein.

After the steel shells have been cleaned out, the pile shall be constructed expeditiously in order to prevent deterioration of the surrounding foundation material. The steel shells shall be free of any soil, rock, or other material deleterious to the bond between the steel shell and concrete prior to placing reinforcement and concrete.

Equipment or methods used for cleanout shall not damage shear rings.

Constructing Rock Sockets.—Care shall be taken during construction of the rock sockets to prevent disturbing the material surrounding the bottom of the steel shell and the rock socket. Equipment and methods used for constructing the rock socket shall not cause quick soil conditions, or cause scouring or caving around or below the rock socket. Rock sockets shall be constructed under a full head of slurry. The rock socket shall extend to the specified tip elevation shown on the plans. If the Contractor, at the Contractor's option or due to the permanent steel shell acceptance criteria, drives the steel shell below the elevation shown on the plans, the bottom of the rock socket shall be lowered so that the socket extends at least to the specified length below the bottom of the steel shell as shown on the plans.

Prior to drilling the rock socket, the Contractor shall replace all water within the cast-in-drilled-hole concrete pile with the premixed slurry. The total head of water and slurry shall remain unchanged during the replacement operation.

The materials surrounding the bottom of the steel shell shall not enter the pile shaft during construction of the rock socket prior to and during placement of the concrete. The Contractor shall take measures to prevent inflow of materials.

After excavation has begun, the pile shall be constructed in a continuous and expeditious manner in order to prevent deterioration of the surrounding foundation material from air slaking or from the presence of slurry. Rock sockets shall be free of any soil, rock, or other material deleterious to the bond between the rock and concrete prior to placing reinforcement and concrete.

The Contractor shall be responsible for constructing the rock sockets by methods that will prevent sloughing and minimize damage and deterioration of the rock walls of the rock socket, prevent slaking of claystone at Tower T2, ensure that the concrete is placed without inclusions of voids, debris, or excessive pockets of soft laitance or segregated concrete, ensure that reinforcement is not displaced by concrete placement and by methods that maintain the bond of concrete to the reinforcement and to the pile. As a minimum, the Contractor shall conform to the construction methods required by these special provisions. Additional precautionary measures may be necessary to successfully construct the work.

Percussion type drills shall not be used for the drilling of rock sockets. Air-assisted, reverse circulation, full face rotary drilling methods shall be used for drilling and for clean-out of the bottom of the rock socket before concrete placement.

Prior to installing steel reinforcement, the condition of the hole will be inspected by the Engineer by means of a Koden model DM-684 drilling monitor or caliper. The Contractor shall provide appropriate safety and fall protection measures, and a power source capable of maintaining a power supply of 90-110 VAC and 60 Hz.

The caliper equipment consists of a Winch unit and a Recorder unit. The Contractor shall be responsible for positioning the Caliper equipment over the hole, repositioning the winch unit for a minimum of three readings of the hole, and removing the equipment from the worksite as directed by the Engineer. Once the equipment is positioned and powered, the data collection will take approximately two hours. The Contractor shall be responsible for any damage to the State's equipment caused by the Contractor's handling of the equipment or any of the Contractor's other operations, and shall promptly replace damaged equipment in kind. Should the Engineer fail to complete the measurements within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in completing the measurements, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

In order to minimize the degradation with time of rock exposed by the drilling of rock sockets, the time between completion of caliper measurements and placing of concrete shall not exceed 48 hours.

The time between the start of drilling and removal of drilling equipment from the cast-in-drilled-hole concrete pile shall not exceed 24 hours. Should the time between the start of drilling and removal of drilling equipment exceed 24 hours, the sides of the rock socket shall be cleaned with a rotary wire brush and the rock socket cleaned of all debris and sediment.

Additional cleaning for final clean-out of the bottom of the rock socket is anticipated after the placement of reinforcing steel and just prior to placing concrete. The use of air lifts for cleaning out rock sockets shall be subject to the approval of the Engineer.

If the Contractor drills the hole below the specified tip elevation of the rock socket, the Contractor shall thoroughly clean the drilled hole as specified herein.

Temporary casing will not be permitted for the rock socket.

Placing Reinforcement.—Reinforcement shall be securely blocked with roller type spacers to clear the sides of the steel shell and rock socket. Concrete spacer blocks shall not be used.

One field splice will be permitted in each reinforcement cage.

The Contractor's attention is directed to the need for special reinforcing ties or other devices needed to hold the vertically bundled bars in the required position shown on the plans.

The Contractor shall provide a monitoring device, such as a wire or cable telltale attached to the reinforcement and extending to the top of the steel shell, or other device approved by the Engineer, which will detect any upward movement of the reinforcement. If movement is noted, concrete placing procedures, such as depth of pipe or rate of placement, shall be adjusted before additional concrete is placed.

Placing Concrete.—During concrete placement below the lower construction joint shown on the plans, the slurry level shall be maintained above 3 meters of mean sea level unless otherwise approved in writing by the Engineer.

Initial concrete placement under slurry shall stop at 600 mm above the lower construction joint. Prior to concrete placement above the lower construction joint, at least 600 mm of concrete shall be removed.

The concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Placing concrete shall be a continuous operation lasting not more than 12 hours between placing the first load of concrete and completion of placing the final load of concrete in the pile to the lower construction joint shown on the plans, unless otherwise approved in writing by the Engineer. Cold joints will not be permitted above the lower construction joint. Construction joints other than those shown on the plans will not be permitted. The concrete shall be placed with gravity fed delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of the following:

A tremie tube or tubes, each of which are at least 250 mm in diameter.

No more than one tube shall be supplied from a single funnel or hopper.

Conveyors or other delivery systems shall not discharge concrete directly into the delivery tubes or steel shells.

The delivery tube system shall consist of watertight tubes with gasketted joints and sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 250-mm tube.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a water tight cap. The cap shall be designed to be released as the tube is charged. The tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained to prevent reentry of the slurry into the tube. Until at least 3 m of concrete has been placed, the tip of the delivery tube shall be within 150 mm of the bottom of the pile, and then the embedment of the tip shall be maintained at least 3 m below the top surface of the concrete. The Contractor shall continuously monitor the top of concrete during concrete placement. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, the tube charged with concrete, and the operation restarted by pushing the capped tube 3 m into the concrete and then reinitiating the flow of concrete.

The concrete delivery tube system shall remain fixed horizontally while concrete is flowing.

Pile concrete shall be free of contamination from slurry or residual foundation material.

When slurry is used, the slurry level shall be maintained within 3000 mm of the cutoff elevation of the permanent steel shell.

When slurry is used, a fully operational standby concrete pump, adequate to complete the work in the time specified, shall be provided at the site during concrete placement at all times.

A log of the placing of the concrete in each pile shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, rock socket tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of steel shell, and details of any hole stabilization method and materials used. The log shall include a 215 mm x 280 mm sized graph of the concrete placed versus depth of pile filled. The graph shall be plotted continuously throughout placing of concrete. The depth of pile filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 1.5 m of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within one working day of completion of placing concrete in the pile.

After placing reinforcement and prior to placing concrete in the drilled hole or above the construction joint, if drill cuttings settle out of slurry, as determined by the Engineer, the bottom of the drilled hole or construction joint shall be cleaned.

Material resulting from placing concrete in rock sockets and using slurry shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Inspection Pipes for Acceptance Testing

Vertical inspection pipes shall be provided in all cast-in-drilled-hole concrete piles that are 600 mm in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control the groundwater. “

In addition to inspection pipes, provisions shall be made for the lateral support of downhole seismic sensor casings through the piles.

Attention is directed to “Seismic Monitoring Electrical System” of these special provisions for sensor and casing requirements.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with a nominal inside diameter of 50 mm. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 50-mm diameter clear opening from 1.0 m above the work platform down to the bottom of the reinforcing cage. The elevation of the work platform shall be at least 1.0 m above MHHW. It is anticipated that extension of the pile reinforcement, steel rods, templates, and bracing shall be required to support the inspection pipes. Inspection pipes shall be placed to avoid interference with steel framing, hanger rods and other supporting elements at the Tower footing.

If the Contractor drills the hole below the specified tip elevation of the rock socket, the Contractor shall extend the inspection pipes to 100 mm clear of the bottom of the drilled hole.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 75 mm clear of the vertical reinforcement, at a uniform spacing not exceeding 840 mm measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. When the vertical reinforcement is not bundled and each bar is not more than 26 mm in diameter, inspection pipes may be placed 50 mm clear of the vertical reinforcement. The inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the clear spacing required herein. The pipes shall be installed in straight alignment, parallel to the main reinforcement, and securely fastened in place to prevent misalignment during installation of the reinforcement and placing of concrete in the hole.

The Contractor shall use water to maintain hydrostatic balance within the inspection pipe. The water in the inspection pipe shall be removed prior to the gamma-gamma logging test.

The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 48.3-mm diameter rigid cylinder 610 mm long through the complete length of pipe. If the 48.3-mm diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 32.0-mm diameter rigid cylinder 1.375 m long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 32.0-mm diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

The Contractor shall replace each inspection pipe that does not pass the 32.0-mm diameter cylinder with a 50.8-mm diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing, no more than 150 mm inside the reinforcement, and coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 8.0 m of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests, and providing access to said piling, the Contractor shall allow 15 working days for the Engineer to conduct these tests if the 48.3-mm diameter cylinder passed all inspection pipes, and 20 working days if only the 32.0-mm diameter cylinder passed all inspection pipes. Should the Engineer fail to complete such tests within the time allowance, and if in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

If crosshole sonic logging tests are conducted by the Engineer, water shall be placed and maintained in the inspection pipes until the testing is complete.

All inspection pipes and cored holes in a pile shall be dewatered and filled with grout after notification by the Engineer that the pile is acceptable. Placement and removal of water in the inspection pipes shall be at the Contractor’s expense. Grout shall conform to the requirements in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The inspection pipes and holes shall be filled using grout tubes that extend to the bottom of the pipe or hole or into the grout already placed.

If acceptance testing performed by the Engineer determines that a pile does not meet the requirements of the specifications, then that pile will be rejected and all depositing of concrete under slurry for the purpose of controlling groundwater shall be suspended until written changes to the methods of pile construction are approved in writing by the Engineer.

The Contractor shall submit to the Engineer for approval a mitigation plan for repair, supplementation, or replacement for each rejected cast-in-drilled-hole concrete pile, and this plan shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. Prior to submitting this mitigation plan, the Engineer will hold a repair feasibility meeting with the Contractor to discuss the feasibility of repairing rejected piling. The Engineer will consider the size of the defect, the location of the defect, and the design information and corrosion protection considerations for the pile. This information will be made available to the Contractor, if appropriate, for the development of the mitigation plan. If the Engineer determines that it is not feasible to repair the rejected pile, the Contractor shall not include repair as a means of mitigation and shall proceed with the submittal of a mitigation plan for replacement or supplementation of the rejected pile.

If the Engineer determines that a pile does not require mitigation due to structural, geotechnical, or corrosion concerns, the Contractor may elect to not repair anomalies found during acceptance testing of that pile. For the unrepaired pile, no payment will be made for the length of pile affected by the anomaly, as determined by the Engineer.

Pile mitigation plans shall include the following:

1. The designation and location of the pile addressed by the mitigation plan.
2. A review of the structural, geotechnical, and corrosion design requirements of the rejected pile.
3. A step by step description of the mitigation work to be performed, including drawings if necessary.
4. An assessment of how the proposed mitigation work will address the structural, geotechnical, and corrosion design requirements of the rejected pile.
5. Methods for preservation or restoration of existing earthen materials.
6. A list of affected facilities, if any, with methods and equipment for protection of these facilities during mitigation.
7. The State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post , and the Contractor's (and Subcontractor's if applicable) name on each sheet.
8. A list of materials, with quantity estimates, and personnel, with qualifications, to be used to perform the mitigation work.
9. The seal and signature of an engineer who is licensed as a Civil Engineer by the State of California.

For rejected piles to be repaired, the Contractor shall submit a pile mitigation plan that contains the following additional information:

1. An assessment of the nature and size of the anomalies in the rejected pile.

2. Provisions for access for additional pile testing if required by the Engineer.

For rejected piles to be replaced or supplemented, the Contractor shall submit a pile mitigation plan that contains the following additional information:

1. The proposed location and size of additional piling.
2. Structural details and calculations for any modification to the structure to accommodate the replacement or supplemental piling.

All provisions for cast-in-drilled-hole concrete piling shall apply to replacement piling.

The Contractor shall allow the Engineer 15 working days to review the mitigation plan after a complete submittal has been received.

Should the Engineer fail to review the complete pile mitigation submittal within the time specified, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the pile mitigation plan, an extension of time commensurate with the delay in completion of the work thus caused will be granted in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

When repairs are performed, the Contractor shall submit to the Engineer a mitigation report within 10 days of completion of the repair. This report shall state exactly what repair work was performed and quantify the success of the repairs relative to the submitted mitigation plan. The mitigation report shall be stamped and signed by an engineer that is licensed as a Civil Engineer by the State of California. The mitigation report shall show the State assigned contract number, bridge number, full name of the structure as shown on the contract plans, District-County-Route-Kilometer Post, and the Contractor (and Subcontractor if applicable) name on each sheet. The Engineer shall be the sole judge as to whether a mitigation proposal is acceptable, the mitigation efforts are successful, and to whether additional repairs, removal and replacement, or construction of a supplemental foundation is required.

SLURRY.--Slurry shall be commercial quality synthetic drilling slurry and shall conform to the requirements of these special provisions. Mineral slurry shall not be used.

Slurry shall be premixed prior to placement in the cast-in-drilled-hole concrete piling.

Water used for mixing slurry shall conform to the requirements in Section 90-2.03, "Water," of the Standard Specifications and these special provisions. At Tower T3, natural ground water and seawater in the cast-in-drilled-hole concrete pile may be used for mixing slurry when approved by the Engineer. At Tower T2, water mixed with salt shall be used for mixing slurry. Salt content shall be 6 percent minimum. Seawater mixed with salt so that salt content is 6 percent minimum may be used for mixing slurry when approved by the Engineer. Slurry mixing sequence shall conform to the requirements of these special provisions, and the recommendations of the slurry manufacturer.

Slurry shall not weaken the bond between the concrete and both the reinforcement and the foundation material at the sides of the excavation.

The Contractor shall sample and test all slurry in the presence of the Engineer, unless otherwise directed. The date, time, names of the persons sampling and testing the slurry, and results of the tests shall be recorded and shall be approved by the Engineer before concrete is placed. A copy of slurry test results shall be delivered to the Engineer at the completion of each pile.

Synthetic.--Synthetic slurries shall be used and mixed in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd. Suite 216 735 Broad Street Chattanooga, TN 37402 (800) 525-5237
Super Mud	PDS Company 8140 East Rosecrans Ave. Paramount, CA 90723 (800) 782-3222

Inclusion of a synthetic slurry on the above list may be obtained by meeting the Department's requirements for synthetic slurries. The requirements can be obtained from the Office of Structure Design, P.O. Box 942874, Sacramento, CA 94274-0001.

Synthetic slurries listed may not be appropriate for a given site.

A manufacturer's representative, as approved by the Engineer, shall provide technical assistance for the use of their product, shall be at the site prior to introduction of the synthetic slurry into a drilled hole, and shall remain at the site until released by the Engineer.

SlurryPro CDP synthetic slurries shall be mixed in conformance with the following sequence:

1. Bring water to the required range of pH by using the SlurryPro product, ProTek.
2. Mix the water with SlurryPro CDP synthetic slurry.
3. Add the SlurryPro product, MPA. MPA shall be diluted to a 10 percent solution prior to adding to the water and slurry mixture.
4. Add salt to obtain the required salt content. Salt may be mixed with the water prior to adding ProTek and MPA.
5. Adjust pH by using ProTek.

Super Mud synthetic slurries shall be mixed in conformance with the following sequence:

1. Bring fresh, unsalted water or seawater to the required range of pH by using soda ash (Na_2CO_3) or the product Water Treat.
2. Mix the water with Super Mud concentrate to form a viscous slurry. Use 10 grams of Super Mud for 250 to 500 grams of fresh, unsalted water, or as recommended by the manufacturer.

3. Add salt to obtain the required salt content.
4. Adjust pH.
5. Fresh, unsalted water may be mixed with Super Mud to form a concentrated mixture prior to adding pH-conditioned salt water, including seawater, with minimum salt content to the mixture, provided slurry with required viscosity can be attained.

Synthetic slurries shall be sampled and tested at both mid-height and near the bottom of the rock socket. Samples shall be taken and tested during drilling as necessary to verify the control of the properties of the slurry. Samples shall be taken and tested when drilling is complete, but prior to final cleaning of the bottom of the hole. When samples are in conformance with the requirements shown in the following tables for each slurry product, the bottom of the hole shall be cleaned and any loose or settled material removed. Samples shall be obtained and tested after final cleaning with reinforcing steel in place and just prior to placing concrete.

SlurryPro CDP synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SLURRYPRO CDP KB Technologies Ltd.		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - during drilling - prior to final cleaning - just prior to placing concrete	 less than or equal to 1075* less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling -prior to final cleaning - just prior to placing concrete	 38 to 127 less than or equal to 74	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	10 to 11.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - just prior to placing concrete	 less than or equal to 0.5	Sand API 13B-1 Section 5
*Salt content shall be a minimum of 6 percent by weight, and the allowable densities shall be increased by a minimum of 65 kg/m^3. Slurry temperature shall be at least 4 degrees Celsius when tested.		

Super Mud synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SUPER MUD PDS Company		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - prior to final cleaning - just prior to placing concrete	less than or equal to 1025*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/liter) - during drilling - prior to final cleaning - just prior to placing concrete	34 to 64 less than or equal to 64	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*Salt content shall be a minimum of 6 percent by weight, and the allowable densities shall be increased by a minimum of 65 kg/m^3. Slurry temperature shall be at least 4 degrees Celsius when tested.		

The viscosity of slurry shall be maintained during drilling, and during final cleaning. To maintain viscosity of slurry using SlurryPro, MPA and SlurryPro synthetic slurry shall be added to the slurry in the cast-in-drilled-hole concrete pile. To maintain viscosity of slurry using Super Mud, Super Mud synthetic slurry shall be added to the slurry in the cast-in-drilled-hole concrete pile. Any fresh slurry to be added to the slurry in the cast-in-drilled-hole concrete pile shall have a salt content of 6 percent minimum.

Slurry viscosity and salt content shall be regularly monitored and as determined necessary by the Engineer. Dissolved salt probes may be used. The accuracy of said probes shall be tested to ensure that slurry mixed with drill cuttings will not give erroneous results.

Water.--At the option of the Contractor water may be used as slurry for cast-in-drilled-hole concrete piling at Tower T3, except as noted elsewhere in these special provisions.

The Contractor shall be prepared to use synthetic slurry in the event that water is not effective as determined by the Engineer.

Water slurry shall be tested for conformance to the requirements shown in the following table:

WATER SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (kg/m^3) - prior to final cleaning - just prior to placing concrete	67 *	Mud Weight (Density) API 13B-1 Section 1
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, salt water slurry may be used, and the allowable densities may be increased up to 32 kg/m^3.		

OPEN ENDED CAST-IN-STEEL-SHELL CONCRETE PILING

Cast-in-steel-shell concrete piling at Bent 7 Crockett Viaduct, at South Anchorage, at Pier P1, and at the dolphin and fender near Tower T3 and the dolphin near Tower T2 shall consist of driven open ended steel shells filled with reinforced cast-in-place concrete and shall conform to the provisions in Section 49-4, "Cast-in-Place Concrete Piles," of the Standard Specifications and these special provisions.

Steel shells at the South Anchorage shall have shear studs welded to the outside of the shell as shown on the plans. The shear studs shall conform to the requirements of ASTM Designation: A 108 and ANSI/AASHTO/AWS D1.5.

South Anchorage piles, T4 through T14, shall not be driven beyond the specified tip elevations shown on the plans due to the proximity to the footing of Bent 7, Crockett Viaduct. The Contractor shall notify the Engineer immediately if these piles do not achieve the nominal resistance.

The piles shall be installed open ended and no internal plates shall be used.

Materials

At the Contractor's option, the Contractor may use either the 12.5-mm maximum combined aggregate grading or the 9.5-mm maximum combined aggregate grading. The grading requirements for the 12.5-mm maximum coarse aggregate and the 9.5-mm maximum coarse aggregate are shown in the following table:

	Percentage Passing Primary Aggregate Nominal Size			
	12.5 mm x 4.75 mm		9.5 mm x 2.36 mm	
Sieve Sizes	Operating Range	Contract Compliance	Operating Range	Contract Compliance
19 mm	100	100		
12.5 mm	82 - 100	80 - 100	100	
9.5 mm	X ± 15	X ± 22	X ± 15	X ± 20
4.75 mm	0 - 15	0 - 18	0 - 25	0 - 28
2.36 mm	0 - 6	0 - 7	0 - 6	0 - 7

In the table above, the symbol X is the gradation which the Contractor proposes to furnish for the 9.5-mm sieve size.

The gradation proposed by the Contractor for the 12.5-mm x 4.75-mm primary aggregate or for the 9.5-mm x 2.36-mm primary aggregate shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Sizes	Limits of Proposed Gradation
12.5 mm x 4.75 mm	9.5 mm	40 - 78
9.5 mm x 2.36 mm	9.5 mm	50 - 85

The combined aggregate grading for the 12.5-mm x 4.75-mm primary aggregate nominal size or for the 9.5-mm x 2.36-mm primary aggregate nominal size shall be within the following limits:

Grading Limits of Combined Aggregate		
	Percentage Passing	
Sieve Sizes	12.5-mm Max.	9.5-mm Max.
19 mm	100	100
12.5 mm	90 - 100	90 - 100
9.5 mm	55 - 86	55 - 86
4.75 mm	45 - 63	45 - 63
2.36 mm	35 - 49	35 - 49
1.18 mm	25 - 37	25 - 37
600 µm	15 - 25	15 - 25
300 µm	5 - 15	5 - 15
150 µm	1 - 8	1 - 8
75 µm	0 - 4	0 - 4

Construction

The Contractor shall submit to the Engineer for approval, a cleanout method for open ended cast-in-steel-shell concrete piling. Care shall be taken during cleaning out of open ended steel shells to prevent disturbing the foundation material surrounding the pile. Piles at Bent 7 Crockett Viaduct, at Pier P1 and at the South Anchorage where center relief drilling is not used shall be cleaned out up to the level of concrete shown on the plans plus any seal course within the pile. Equipment or methods used for cleaning out steel shells shall not cause quick soil conditions or cause scouring or caving around or below the piles. Open ended steel shells shall be free of any soil, rock or other material deleterious to the bond between concrete and steel prior to placing reinforcement and concrete.

After the steel shells have been cleaned out, the pile shall be constructed expeditiously in order to prevent deterioration of the surrounding foundation material from the presence of water. Deteriorated foundation materials, including materials that have softened, swollen or degraded, shall be removed from the bottom of the steel shells and shall be disposed of.

Drill cuttings, slurry and material resulting from cleaning out the steel shells shall be disposed of in conformance with the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, and “Contaminated and Hazardous Materials” of these special provisions, unless otherwise specified or permitted by the Engineer.

Reinforcement shall be placed and secured symmetrically about the axis of the pile and shall be securely blocked to clear the sides of the steel shell.

If conditions render it impossible or inadvisable in the opinion of the Engineer to dewater the open ended cast-in-steel-shell concrete piling prior to placing reinforcement and concrete, then the bottom of the shell shall be sealed in conformance with the provisions in Section 51-1.10, "Concrete Deposited Under Water," of the Standard Specifications. The sealed shell shall then be dewatered and cleaned out as specified herein.

Concrete shall be placed to at least the depth as shown on the plans. If center relief drilling is used, concrete shall also be placed to the depth of drilling.

WELDING AND NONDESTRUCTIVE TESTING FOR STEEL PIPE PILING

Description.--Steel pipe piling at Towers T2 and T3 shall consist of permanent steel shells for cast-in-drilled-hole concrete piling and shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Existing welds in state-furnished permanent steel shells are not required to receive nondestructive testing (NDT).

Spacing of field welds for permanent steel shells shall be a minimum of 18 m.

Permanent steel shells at Towers T2 and T3 shall have shear ring bars welded to the inside of the shell as shown on the plans. The shear ring bars shall have a minimum yield strength of 248 MPa.

General.--Wherever reference is made to the following American Petroleum Institute (API) specifications in the Standard Specifications, on the project plans or in these special provisions, the year of adoption for these specifications shall be as follows:

API Codes	Year of Adoption
API 2B	1990
API 5L	1995

Handling devices may be attached to steel pipe piling. Welds attaching these devices shall be aligned parallel to the horizontal axis of the pile and shall conform to the requirements of "Field Welding" specified herein. Permanent bolted connections shall be corrosion resistant. Prior to making attachments, the Contractor shall submit a plan to the Engineer that includes the locations, handling and fitting device details and connection details. Attachments shall not be made to the steel pipe piling until the plan is approved in writing by the Engineer. The Engineer shall have 7 calendar days to review the plan. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the plan, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Each length of steel pipe piling shall be marked in conformance with the requirements of ASTM Designation: A 252 and also with end match markings as required by the Contractor.

Manufactured Steel Pipe.--Manufactured steel pipe is defined as pipe that is produced at a facility where an electric fusion welder, electric resistance welder, or seamless pipe operation is used in conformance with ASTM Designations: A 252, A 53, A 135, A 139, API 5L, or AWWA C200; where this steel pipe can have lengths at least 9 m long without a circumferential splice; and where this manufacturing can be done on a daily basis.

Manufactured steel pipe used for steel pipe piling shall conform to the following requirements:

1. The outside circumference of the steel pipe piling end shall not vary by more than 10 mm from that corresponding to the diameter shown on the plans.
2. The maximum allowable misalignment for adjacent steel pipe pile edges to be welded shall be 0.1875 times the wall thickness, but not more than 1.6 mm.
3. Steel pipe pile straightness shall conform to the requirements of API 5L, Section 7.6, "Straightness."
4. Welds made at a permanent manufacturing facility shall be made by either an automatic fusion weld or an electric resistance weld process.
5. Twenty-five percent of each longitudinal, circumferential and spiral weld made at a permanent manufacturing facility shall receive nondestructive testing (NDT) by either radiographic, radioscopic, real time imaging systems or ultra sonic methods that are in conformance with the requirements of AWS D1.1. Records of this testing shall be made available to the Engineer upon request. The acceptance and repair criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed. The additional NDT shall be made on both sides of the repair for a length equal to 10% of the length of the pipe outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall receive NDT.

Fabricated Steel Pipe.--Fabricated steel pipe is defined as pipe produced at a facility where a variety of steel fabrication including roll forming and welding steel plate into pipe is performed, where this pipe is at least 19 mm in wall thickness, where this pipe is produced in conformance with API 2B, and where this fabrication can be done on a daily basis.

Fabricated steel pipe used for steel pipe piling shall conform to API 2B and the following requirements:

1. API site license and API monogram are not required.
2. Weld filler metal shall conform to the requirements of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest and verification test requirements need not be conducted provided that certified test reports are provided for the consumables to be used.
3. Twenty-five percent of each longitudinal and circumferential weld made at a permanent fabrication facility shall receive NDT by either radiographic, radioscopic, real time imaging systems or ultra sonic methods that are in conformance with the requirements of AWS D1.1, except at the zones as shown on the plans where 100 percent of each longitudinal weld shall receive NDT. Records of this testing shall be made available to the Engineer upon request. The acceptance and repair criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional NDT shall be performed. The additional NDT shall be made on both sides of the repair for a length equal to 10% of the length of the pipe outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall receive NDT.

Field Welding.--Field welding of steel piling is defined as welding performed after the certificate of compliance has been furnished by the manufacturer or fabricator and shall conform to the following requirements:

1. Match marking of pipe ends at the manufacturing or fabrication facility is recommended for piling to ensure weld joint fit-up. Prior to positioning any 2 sections of steel pipe to be spliced by field welding, including those that have been match marked at the manufacturing or fabrication facility, the Contractor shall equalize the offsets of the pipe ends to be joined and match mark the pipe ends.
2. Welds made in the flat position or vertical position (where the longitudinal pipe axis is horizontal) shall be single-vee groove welds. Welds made in the horizontal position (where the longitudinal pipe axis is vertical) shall be single-bevel welds. Joint fit-ups shall conform to the requirements for tubular sections in AWS D1.1 and these special provisions.
3. The minimum thickness of the backing ring shall be 6 mm and the ring shall be continuous. Radiographic, magnetic particle or ultrasonic testing shall be used to assure soundness of the backing ring per requirements in AWS D1.1, Section 6. All splices in the backing ring shall be made by complete penetration welds. These welds shall be completed and inspected prior to final insertion into a pipe end. Attachment of backing rings to pipe ends shall be done using the minimum size and spacing of tack welds that will securely hold the backing ring in place. Tack welding shall be done in the root area of the weld splice. Cracked tack welds shall be removed and replaced prior to subsequent weld passes. The gap between the backing ring and the steel pipe piling wall shall be no greater than 2 mm. One localized portion of the splice, that is equal to or less than a length that is 20% of the outside circumference of the pipe, as determined by the Engineer, may be offset by a gap equal to or less than 6 mm provided that this localized portion is first seal welded using shielded metal arc E7016 or E7018 electrodes. The Contractor shall mark this localized portion so that it can be referenced during NDT. Backing rings shall have a minimum width of 1 1/2 times the thickness of the pile to be welded so that they will not interfere with the interpretation of the NDT.
4. For steel pipe with an outside diameter greater than 1.1 m and with a wall thickness greater than 25.4 mm, the root opening tolerances may be increased to a maximum of 5 mm over the specified tolerances.
5. Weld filler metal shall conform to the requirements shown in Table 4-1 of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest and verification test requirements need not be conducted provided that certified test reports are provided for the consumables to be used.
6. For field welding, including attaching backing ring and making repairs, the preheat and interpass temperature shall be in accordance with AWS D1.1, Section 3.5 "Minimum Preheat and Interpass Temperature Requirements," with Table 3.2, Category C; and the minimum preheat and interpass temperature shall be 66° C, regardless of the pipe pile wall thickness or steel grade. In the event welding is disrupted, preheating to 66° C must occur before welding is resumed.

7. Welds shall not be water quenched. Welds shall be allowed to cool unassisted.
8. Splices made by field welding steel pipe piling shall receive NDT as follows:

   Radiographic testing (RT) shall be used for each field weld, including splices that are made onto a portion of the steel pipe piling that has been installed and any repair made to a splice weld. Testing shall be done at locations selected by the Engineer. The length of a splice weld, not including repairs, where RT is to be used, shall have a cumulative length that is equal to 25% of the pipe outside circumference. The Engineer may select several locations on a given splice for RT, except at the zones as shown on the plans where 100 percent of each longitudinal weld shall receive NDT. The top cover pass shall be ground smooth at the locations to be tested. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional RT shall be performed. The additional RT shall be made on both sides of the repair for a length equal to 10% of the length of the pipe outside circumference. After the additional RT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall be radiographically tested.
   At the option of the Contractor, ultrasonic testing may be substituted as the NDT method for splices made by field welding steel pipe piling, as follows:

   Ultrasonic testing (UT) shall be used for each field weld, including splices that are made onto a portion of the steel pipe piling that has been installed and any repair made to a splice weld. Testing shall be done at locations selected by the Engineer. The length of a splice weld, not including repairs, where UT is to be used, shall have a cumulative length that is equal to 25% of the pipe outside circumference. The Engineer may select several locations on a given splice for UT, except at the zones as shown on the plans where 100 percent of each longitudinal weld shall receive NDT. The acceptance criteria shall conform to the requirements of AWS D1.1, Section 6, for cyclically loaded nontubular connections subject to tensile stress. If repairs are required in a portion of the weld, additional UT shall be performed. The additional UT shall be made on both sides of the repair for a length equal to 10% of the length of the pipe outside circumference. After the additional UT is performed, and if more repairs are required that have a cumulative length equal to or more than 10% of the length of the pipe outside circumference, then the entire splice weld shall be ultrasonically tested.

9. For steel pipe piling, including bar reinforcement in the piling, the Engineer shall be allowed 48 hours to review the "Welding Report," specified in "Welding Quality Control" of these special provisions, and respond in writing after all the required items have been received. No field welded steel pipe piling shall be installed, and no reinforcement in the piling shall be encased in concrete until the Engineer has approved the above requirements in writing. Should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.
10. At the Contractor's option, a steel pipe pile may be re-tapped to prevent pile set-up; however, the field welded splice shall remain at least one meter above the work platform until that splice is approved in writing by the Engineer.

MEASUREMENT AND PAYMENT (PILING)

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

The length of permanent steel shell will be measured and paid for by the meter from the specified pile tip, or revised specified pile tip, of the permanent steel shell to the plane of pile cut-off.

The length of cast-in-drilled-hole concrete piling (rock socket) will be measured and paid for by the meter from the tip of the permanent steel shell to the specified tip, or revised specified tip, of the rock socket.

Payment for cast-in-place concrete piling will be as provided in Section 49-6.02, "Payment," of the Standard Specifications except that, when the diameter of cast-in-place concrete piling is shown on the plans as 600-mm or larger, reinforcement in the piling will be paid for as bar reinforcing steel (bridge).

Full compensation for furnishing and placing additional testing reinforcement, load test anchorages, and for cutting off test piles as specified shall be considered as included in the contract price paid for piling of the type or class shown in the Engineer's Estimate, and no additional compensation will be allowed.

No additional compensation or extension of time will be made for additional foundation investigation, installation and testing of indicator piling, cutting off piling and restoring the foundation investigation and indicator pile sites, and review of request by the Engineer.

The sixth paragraph in Section 49-6.02, "Payment," of the Standard Specifications is amended to read:

If precast prestressed concrete piling or steel pipe piling is manufactured or fabricated more than 480 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impractical and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing piling of the types shown in the Engineer's Estimate will be reduced $5000 for each manufacture or fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles and an additional $3000 ($8000 total) for each manufacture or fabrication site located more than 4800 air line kilometers from both Sacramento and Los Angeles.

The contract price paid per meter for 3000 mm permanent steel shell shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in furnishing and installing permanent steel shells for cast-in-drilled-hole concrete piling, complete in place, including shear ring bars, methods used to obtain the required steel shell penetration, and cleaning out steel shells, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per meter for install state-furnished 3000 mm permanent steel shell shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in installing state-furnished permanent steel shells for cast-in-drilled-hole concrete piling, complete in place, including transportation from the State storage facility, handling, splicing, methods used to obtain the required steel shell penetration, and cleaning out steel shells, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Full compensation for shear ring bars and hardened steel driving tips for state-furnished permanent steel shells shall be considered as included in the contract price paid per meter for 3000 mm permanent steel shell and no additional compensation will be allowed therefor.

Full compensation for disposal of material resulting from pile installation; for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with water and then grout; for drilling for rock sockets; for drilling oversized rock sockets, filling cave-ins and oversized rock sockets with concrete, and redrilling through concrete; installation of seismic sensor casings; and any precautionary measures necessary to construct the work shall be considered as included in the contract prices paid per meter for cast-in-drilled-hole concrete piling of the types and sizes listed in the Engineer's Estimate and no additional compensation will be allowed therefor.

When at the Contractor's option, the Contractor installs a steel shell to depths below the specified tip elevation or revised specified tip elevation, no additional compensation will be made for furnishing and installing additional steel shell length, bar reinforcement, concrete, and inspection pipes.

No additional compensation will be made for cast-in-drilled-hole concrete pile (rock socket) length that is constructed in excess of the minimum length of rock socket shown on the plans.

Reinforcement in the cast-in-steel shell concrete piling will be paid for as bar reinforcing steel (bridge).

Full compensation for shear studs shall be considered as included in the contract prices paid per meter for furnishing steel shells for cast-in-steel shell concrete piling of the types and sizes listed in the Engineer's Estimate and no additional compensation will be allowed therefor.

Full compensation for drilling through the center of open ended steel shells to obtain the required penetration and for disposing of this material shall be considered as included in the contract unit price paid for drive pile and no additional compensation will be allowed therefor.

Full compensation for cleaning out the open ended steel shells prior to installing reinforcement and filling with concrete, for disposing of materials removed from inside the pile, for extra concrete if center relief drilling is used, and for placing seal course concrete and dewatering the open ended steel shells, as shown on the plans, and as specified in these special provisions, and as directed by the Engineer shall be considered as included in the contract unit price paid for drive pile and no additional compensation will be allowed therefor.

Full compensation for conforming to the requirements of "Welding and Nondestructive Testing for Steel Pipe Piling" of these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

Full compensation for redriving monitored piles, for providing access for the Engineer, dewatering during monitoring, and for installing and removing the instruments from the pile shall be considered as included in the contract unit price paid for drive pile and no separate payment will be made therefor. The length of piling to be paid as furnish piling of the classes listed in the Engineer's Estimate shall include the lengths that monitored piles are redriven.

Full compensation for furnishing and coating of flame sprayed plastic on fender piles shall be considered as included in the contract price paid per meter for furnish NPS 16 steel pipe piling and no additional compensation will be allowed therefor.

Full compensation for locating existing piles and for making adjustments to the installation of NPS 16 steel pipe piles to avoid conflict with the existing piles shall be considered as included in the contract unit price paid for drive steel pipe pile (NPS 16) and no additional compensation will be allowed therefor.

Removal of subsurface timber debris from abandoned docks, trestles, moorings, dolphins and fenders in conflict with installation of permanent steel shells will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The NPS 20 pipe sleeves, structural tubing and connection plates at the fender piles will be measured and paid for as furnish structural steel (bridge) and erect structural steel (bridge).

10-1.49 JOINT SEAL ASSEMBLIES (MOVEMENT RATING EXCEEDING 100 mm)

Joint seal assemblies with Movement Ratings greater than 100 mm shall be designed, tested, fabricated, and installed as shown on the plans, and as specified in the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Welding Quality Control" of these special provisions.

Welding procedures shall be in accordance with AASHTO/AWS D1.5-95, Bridge Welding Code.

A qualified representative of the manufacturer shall be present during installation of the first assembly and shall be available for advice during any remaining installations. The representative shall certify to the Engineer in writing that the proper installation procedures are being followed.

The swiveling joint seal assembly at the North Expansion Joint shall be capable of simultaneously allowing ± 635 mm movement in the longitudinal direction and ± 50 mm movement in the transverse direction. The swiveling joint seal assembly at the South Expansion Joint shall be capable of simultaneously allowing ± 500 mm movement in the longitudinal direction and ± 50 mm movement in the transverse direction.

The swiveling joint seal assembly shall be a Maurer System™ Swivel Expansion Joint System by D.S. Brown Company, Type DS-800B and Type DS-640B, or equal, supplied by the following supplier:

VENDOR ADDRESS AND PHONE NUMBER
D.S. BROWN COMPANY 300 E. CHERRY STREET NORTH BALTIMORE, OHIO 45872 TEL: (419) 257-1600 FAX: (419) 257-2200

The supplier shall have a minimum of 5 years experience in designing and fabricating modular bridge expansion joint systems. The joint manufacturer shall provide documentation to verify that at least 3 joint assemblies equal to the swiveling joint seal assembly required for this project have been installed for 3 or more years on bridges in the United States. The Contractor shall provide written certification of the supplier's experience and list of projects within 4 weeks after the contract award date.

The price quoted by the manufacturer for the joint seal assembly is as follows:

Model	**Unit Price**
DS 640B	$18,900.00 LM
DS 800B	$23,600.00 LM

The price quoted will be firm for all orders placed within 3 months after the contract award date provided delivery is accepted on or before October 30, 2000. The per meter price will be increased 5 percent for an order placed more than 3 months after the contract award date and delivery is accepted on or before January 31, 2001. The above prices do not include taxes.

The joint seal assembly price includes all materials including shipment to the job site, technical advice, dynamic testing and inspection by a qualified representative of the manufacturer at the job site at all times during installation of the expansion joint assembly and final inspection of the expansion joint assembly.

The Contractor shall submit complete working drawings for each joint seal assembly to the Office of Structure Design (OSD) in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall show complete details of the joint seal assembly and anchorage components and the method of installation to be followed, including concrete blockout details and any additions or rearrangements of the reinforcing steel from that shown on the plans. For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to OSD for final approval and use during construction.

The working drawings shall be supplemented with complete calculations for the particular joint seal assembly, when requested by the Engineer. Working drawings shall be either 279 mm x 432 mm or 559 mm x 864 mm in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Kilometer Post. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The working drawings shall contain all information required for the proper construction of the joint seal assembly, including installation and waterproofing plans.

The working drawings shall include, but not be limited to, the following:

1. Plans, elevation and section of the joint seal assembly for each movement rating and roadway width showing dimensions and tolerances.
2. All ASTM, AASHTO, or other material designations.
3. Method of installation, including but not limited to, sequence, setting relative to temperature, anchorage during setting, and installation at curbs.
4. Details of the corrosion protection system.
5. Details of lifting locations and mechanisms.
6. Recommendations for storage of the joint system and details of temporary supports for shipping and handling.
7. Details and procedures for field splices of the center beam and edge beam.
8. Welding procedures and weldability analysis for all welded materials.

At the time of working drawings submittal, the Contractor shall submit to the Engineer the supplier’s Certificate of Compliance with the AISC Quality Certification Program - Category III, Major Steel Bridges.

Calculations and working drawings shall be stamped and signed by an engineer who is registered as a Civil Engineer. The engineer shall be an employee of the supplier. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

Supplemental calculations to the working drawings shall include the following:

1. Design calculations for all structural members. The design calculations shall include a fatigue design and a load factor design for all structural elements, connections, and splices.
2. Complete calculations related to the design to accommodate all expected longitudinal (thermal and seismic) and transverse (seismic) movements, as well as vertical and horizontal rotations. This design shall incorporate strip seal glands with a maximum movement range of 80 mm per seal. The joint seal assembly shall be designed for a minimum of one gland for every 127 mm of seismic movement.

Within 3 weeks after final working drawing approval, one set of the corrected good quality prints on 75-g/m^2 (minimum) bond paper (559 mm x 864 mm in size) of all working drawings prepared by the Contractor for each joint seal assembly shall be furnished to OSD.

Each shipment of joint seal assembly materials shall be accompanied by a Certificate of Compliance as provided in Section 6-l.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall state that the materials and fabrication involved comply in all respects to the specifications and data submitted in obtaining approval.

The joint seal assembly shall be installed in accordance with the supplier's instructions, and the advice of the supplier's representative. Two weeks prior to the intended installation, the Engineer shall be supplied with 2 copies of the written instructions. The permanently installed joint seal assembly shall match the finished roadway profile and grades.

One field splice will be allowed in the center beam and edge beam, located at quarter span between support bars. Support bars shall not be field spliced.

The Contractor shall provide a description of the methods for protection of the joint seal assembly, the blockout and supporting system from damage and construction traffic. After installation of the joint seal assembly, construction loads will not be allowed on the expansion joint device. The Contractor shall provide temporary bridging over the joint seal assembly to protect the assembly and appurtenances from construction vehicle loads and any other activities that may damage the joint seal assembly components. The temporary bridging shall remain in place as directed by the Engineer.

The joint seal assembly shall be watertight. After the joint seal assembly has been installed, it shall be flooded for a minimum of one hour to a minimum depth of 75 mm. Leaks shall be repaired as recommended by the supplier and approved by the Engineer.

All forms and debris that interfere with the free action of the joint seal assembly shall be removed.

The maximum movement range of the expansion joint strip seals shall be 80 mm. Box seals or seals utilizing double webs shall not be used.

The neoprene glands shall conform to the requirements in Table 1 of ASTM Designation: D 2628 and the following, except that no recovery tests or compression-deflection tests will be required:

Property	Requirement	ASTM Test Method
Hardness, Type A Durometer, points	55-70	D 2240 (Modified)
Tensile Strength	13.8 MPa min.	D 412
Elongation at break, maximum, percent	250	D 412
Compression set, 70 hours at 100°C, maximum, percent	40	D 395 Method B (Modified)

Neoprene glands shall be continuous, without field splices or joints, including the return up into the barrier.

The joint seal assembly seals shall not protrude above the top of the joint.

Stainless steel shall conform to the requirements of ASTM Designation: A 240, Type 316, with 2b finish.

PTFE shall be 100 percent virgin Teflon conforming to the requirements of Section 18.4.3, Division II - Construction, AASHTO Standard Specifications for Highway Bridges, 16th Edition.

The PTFE shall be bonded under controlled conditions and in accordance with the written instructions of the manufacturer of the PTFE. After completion of the bonding operation, the PTFE surface shall be smooth and free from bubbles.

All metal parts of the joint seal assembly shall conform to the requirements in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. Bolts, nuts and washers shall conform to the requirements of ASTM Designation: A 325 or A 325M. At the Contractor's option, metal parts may conform to the requirements of ASTM Designation: A 572/A 572M.

At the Contractor's option, cleaning and painting of all new metal surfaces of the joint seal assembly, except stainless steel, surfaces in direct contact with the seal, and anchorages embedded in concrete, may be substituted for galvanizing. Cleaning and painting shall be in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and the following:

The surfaces to be cleaned and painted shall be dry blast cleaned in accordance with the provisions of Surface Preparation No. 10, "Near-White Blast Cleaning," of the Steel Structures Painting Council. Blast cleaning shall leave all surfaces with a dense, uniform, angular, anchor pattern of not less than 40 µm as measured in accordance with ASTM Designation: D 4417.

All blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the provisions of AASHTO Designation M 300, Type II, except that the first 3 sentences of Section 4.7, "Primer Field Performance Requirement," and the entire Section 4.7.1 of the AASHTO Specification shall not apply. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory, (916) 227-7000.

The color of the inorganic zinc coating shall essentially match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 7°C or more than 38°C or when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning, except the coating on contact surfaces of high-strength bolted connections may be applied in 1 application.

The total dry film thickness of all applications of inorganic zinc coating shall be not less than 100 µm or more than 200 µm, except that the total dry film thickness on contact surfaces of high-strength bolted connections shall be between one and 75 µm.

All areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass both of the following tests:

The inorganic zinc coating shall have a minimum adhesion to steel of 4 MPa when measured at no more than 6 locations per joint seal assembly in accordance with ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

The inorganic zinc coating cure will be checked by the Engineer. The inorganic zinc coating shall exhibit a solid, hard and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Finish coats will not be required on joint seal assemblies.

Damage to the corrosion protection system shall be repaired at the Contractor’s expense and as approved by the Engineer.

Design of the joint seal assembly shall be based on the following design criteria and results of the dynamic testing.

Except for components in contact with the tires, the assembly and its components shall be designed to support the AASHTO HS20-44 loading with 100 percent impact. Each component in contact with the tires shall support a minimum of 80 percent of the AASHTO HS20-44 loading with 100 percent impact. The tire contact area used to distribute the tire loads shall be 244 mm, measured normal to the longitudinal axis of the assembly, by 508 mm wide. The assembly shall provide a smooth riding joint without slapping of components or wheel tire rumble.

The center and edge beams, support bars, bearings and other structural elements shall be designed for the simultaneous application of the following vertical and horizontal fatigue limit state wheel load ranges listed below:

Vertical Wheel Load Range (Normal to the Roadway Surface)	Horizontal Wheel Load Range (Parallel to the Roadway)
116 kN/wheel	36 kN/wheel

These fatigue limit state wheel ranges include impact.

Alternate wheel load ranges may be used provided that the absolute magnitude of the wheel load ranges, for example the sum of positive and negative loads along the same axis, is not less than the total wheel load ranges.

For design of the center and edge beams, 2 vertical and horizontal load ranges described above shall be spaced 1200 mm apart and applied at the roadway surface as a rectangular patch loading. The rectangular patch shall have a 230 mm length in the direction of traffic and a 510 mm width perpendicular to the direction of traffic.

The percentage of the loads applied to the center beams and edge beams is based on the midrange position of the seals, and the width of the seal opening shall be as follows:

Width of Seal Opening	Percentage
57 mm or less	40
80 mm	50
100 mm	60
120 mm	80

The nominal stress range (f_{SR} Calc) shall be determined at all fatigue critical details by performing a structural analysis of the joint seal assembly using the fatigue limit state load ranges specified. To demonstrate infinite fatigue life performance of the joint assembly, all joint seal assembly structural steel members, welded connections, splices, and miscellaneous steel attachments shall satisfy the following:

$$f_{SR} \text{ Calc} = 2 F_{SR} \text{ Test}$$

where

f_{SR} Calc = Calculated stress range based on the simultaneous application of the vertical and horizontal fatigue limit state wheel ranges.

F_{SR} Test = Constant-amplitude fatigue limit of component as determined from testing.

The Movement Rating of the assembly shall be measured normal to the longitudinal axis of the assembly. The dimensions for positioning the assembly within the Movement Rating during installation shall be measured normal to the longitudinal axis, disregarding any skew of the deck expansion joint. The assembly shall be capable of adjustment to the "a" dimension shown on the plans.

The maximum width of unsupported or yielding components or grooves in the roadway surface of the assembly, measured in the direction of vehicular traffic, shall be 75 mm for service movement.

The assembly shall have cast-in-place anchorage components forming a mechanical connection between the joint components and the concrete deck of the approach span, and a mechanical connection to the suspended span box girder.

The bridge deck surface of the approach span shall conform to the provisions in Section 51-1.17 "Finishing Bridge Deck," of the Standard Specifications prior to placing joint seal assemblies and anchorage.

The assembly shall be completely shop-assembled and placed in a blocked out recess in the concrete deck surface of the approach span. The depth and width of the recess shall permit the installation of the assembly anchorage components or anchorage bearing surface to the planned line and grade.

The maximum depth and width of the recess at the approach span shall be such that the primary reinforcement to provide the necessary strength of the structural members is outside the recess.

All reinforcement other than primary reinforcement shall continue through the recess construction joint into the recess and engage the anchorage components of the assembly.

The vertical expansion joint in barrier shall be available for inspection after placement of the recess concrete around the anchorage components of the assembly.

Dynamic Testing.--A series of dynamic tests shall be performed at an approved laboratory in the presence of the Engineer, unless otherwise directed, on one full-sized joint seal assembly test specimen to verify the performance of the joint seal assembly during a seismic event involving high velocity longitudinal and transverse displacements.

The test specimen shall include a minimum of 3 spans along the length of the joint and 4 support bar boxes, as well as all tributary elements to these components. The test specimen shall be designed and detailed so that the number of cells included in the test specimen shall be adequate to accommodate longitudinal movement of no less than ± 445 mm, corresponding to 70 percent of the required movement for the North Expansion Joint, and a transverse movement of ± 250 mm.

Design of the joint test specimen, including components, and construction procedures used in the fabrication of the test specimen shall be the same as that used in the production joint seal assembly.

Instrumentation shall be installed to the test specimen and test fixture to continuously monitor transverse and longitudinal joint displacements, accelerations, and actuator forces.

The dynamic tests shall be performed on the joint seal assembly as follows:

Install the test specimen in a test fixture designed to accommodate a vertical offset longitudinally across the joint of 6° when the joint is fully closed. This offset will simulate differential vertical movements in the joint seal assembly as the joint is moved longitudinally.

Conduct 3 slow velocity tests (less than 25 mm per second) on the joint specimen with no vertical offset across the joint specimen. The 3 tests shall consist of: 1) longitudinal displacements of ± 445 mm, 2) transverse displacements of ± 250 mm, and 3) longitudinal displacements of ± 445 mm and transverse displacements of ± 250 mm simultaneously.

Conduct 4 dynamic tests using constant amplitude displacement time histories to within approximately 25 mm of the longitudinal joint movement capacity. These 4 tests shall include: 1) maximum longitudinal displacements of ± 420 mm, 2) maximum transverse displacements of ± 250 mm, 3) combined longitudinal (± 420 mm) and transverse (± 250 mm) displacements, and 4) combined longitudinal (± 420 mm) and transverse (± 250 mm) displacements in combination with a vertical offset of 6° when the joint is fully closed. Each test shall consist of 10 displacement cycles at a peak velocity of no less than 1015 mm per second.

Conduct a total of 4 real-time dynamic tests on the joint test specimen. These tests will be conducted with the joint traveling through displacements obtained from a modified displacement-time history approved by the Engineer. The 4 tests shall be conducted for plus and minus longitudinal input combined with plus and minus transverse input as shown in the following table:

	Longitudinal Displacement	Transverse Displacement
Test 1	Maximum +	Maximum +
Test 2	Maximum +	Minimum -
Test 3	Minimum -	Maximum +
Test 4	Minimum -	Minimum -

The maximum and minimum displacements from the time history record shall be modified as necessary to account for the joint test specimen size. Each of the 4 tests shall be conducted with the same longitudinal and transverse displacement histories. The joint shall be repositioned at different offsets between tests to ensure that peak displacements are within no less than 25 mm of the joint test specimen movement limits (approximately ± 420 mm longitudinally and ± 250 mm transversely). The joint test specimen shall be placed in the fixture with a vertical offset longitudinally across the joint of 2° when the joint is fully closed.

The Engineer will inspect the joint test specimen after each test to identify any damage which may have occurred to the joint components.

After completion of the dynamic tests, the Contractor shall completely disassemble the joint test specimen and the Engineer will inspect the specimen for accumulated damage or deterioration to the joint components.

The acceptance criteria for testing the joint seal assembly is as follows:

The joint seal assembly test specimen shall satisfy all aspects of the dynamic tests. The test specimen shall sustain the dynamic testing without any binding, dislocation or unseating of its components. Minor damage and wear to the sliding components which would not impair the ability of the joint to carry emergency traffic will be considered acceptable, as determined by the Engineer.

If the joint seal assembly test specimen fails to meet any of the acceptance criteria for testing as determined by the Engineer, then that joint seal assembly will be rejected and the Contractor shall modify the design or construction procedures and submit revised working drawings including these modifications, and test another test specimen. Dynamic testing shall not begin until the Engineer has approved the revised working drawings in writing. No extension of time or compensation will be made for modifying working drawings or supplemental calculations, for resubmittal and review of working drawings and supplemental calculations, for rejection of a test specimen, and designing and testing additional test specimens

Test Submittals.--At the completion of the dynamic tests, the Contractor shall submit to the Engineer 4 copies of the complete test results for the joint test specimen tested. Data for each test shall list key personnel, test loading equipment, location of test, and a complete record of load and displacement.

The Contractor shall submit to the Engineer 4 copies of previously completed Fatigue Test report for a similar joint seal assembly. The Fatigue Test report shall include information on the lower-bound F_{SR} Test for all critical connections. Testing shall be performed with simultaneously applied vertical and horizontal loads where the horizontal load is 20 percent of the vertical load. The data for fatigue test shall list key personnel, test loading equipment, location of test, and a complete record of load and displacement.

Test submittals shall be submitted to the Engineer for approval no later than 180 days after contract approval.

Damage to the joint seal assembly during shipping or handling will be cause for rejection of the joint seal assembly.

Full compensation for any additional materials or work required because of the application of the optional cleaning and painting shall be considered as included in the contract price paid per linear meter for the joint seal assembly involved, and no additional compensation will be allowed therefor.

WATER PIPING.--

The water piping system shall conform to the requirements of NSF 61, "Drinking Water System Components-Health Effects," Sections 1 through 9, for potable domestic water piping and components.

The water piping system shall have a minimum working-pressure rating of 80 psig (550 kPa).

The pipe and fittings shall be hot dipped galvanized steel, welded and seamless wall pipe, Schedule 40, conforming to the requirements of ASTM Designation: A 53 Grade B.

Flanges shall be 125 lb. (56.7 kg) galvanized steel, conforming to the requirements of ASME Designation: B 16.5 with flange gasket material, and ASME Designation: B 16.21.

Steel-piping expansion joints shall be compound, galvanized, steel fittings with telescoping body and slip-pipe section, including packing rings, packing, limit rods, chrome-plated finish on slip-pipe sections, and flanged ends.

Welded joints shall be shop hot dipped galvanized.

Inspection.--Water piping shall not be enclosed, covered, or put into operation until it is inspected and approved by the Engineer. The Contractor shall notify the Engineer for inspection of piping at least 24 hours before concealing or closing-in after roughing-in, and before setting fixtures. If the Engineer determines that the piping will not pass testing or inspection, the Contractor shall make the required corrections and notify the Engineer for reinspection. Inspection reports shall be prepared and submitted to the Engineer at the completion of inspection.

Testing.--The Contractor shall test for leaks and defects in the piping. If the testing is performed in segments, the Contractor shall submit separate reports for each test, including a diagram showing the portion of piping tested. Water piping shall not be covered or concealed until it has been tested and approved by the Engineer.

Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate the test source and allow to stand for 4 hours.

Leaks and loss in test pressure constitute defects that must be repaired. The Contractor, at the Contractor's expense, shall repair leaks and defects with new materials and retest the piping or portion thereof until satisfactory results are obtained. Testing reports, including required corrective action, shall be prepared and submitted to the Engineer at the completion of the tests.

Cleaning.--Piping shall be purged before use. Purging and disinfecting procedures shall conform to the requirements of AWWA C651 or AWWA C652.

The interior of the water piping shall be cleaned, and the dirt and debris removed as work progresses.

Painting piping.--Steel pipe and fittings shall be painted in the field in accordance with the provisions in Section 59-3, "Painting Galvanized Surfaces," of the Standard Specifications.

ENGINEER'S ESTIMATE

04-013014

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
1	016620	ELECTRONIC MOBILE DAILY DAIRY COMPUTER SYSTEM DATA DELIVERY	LS	LUMP SUM	LUMP SUM	
2	016621	TIME RELATED OVERHEAD	LS	LUMP SUM	LUMP SUM	
3	016622	ESTABLISH MARINE ACCESS	LS	LUMP SUM	LUMP SUM	
4	016623	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM	LUMP SUM	
5	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM	LUMP SUM	
6	074020	WATER POLLUTION CONTROL	LS	LUMP SUM	LUMP SUM	
7	016624	NON-STORM WATER DISCHARGE	LS	LUMP SUM	LUMP SUM	
8	016625	TEMPORARY COVER	M2	5000		
9	016626	TEMPORARY DRAINAGE INLET PROTECTION	EA	19		
10	016627	TEMPORARY EROSION CONTROL	M2	10 100		
11	016228	TEMPORARY CONCRETE WASHOUT	EA	33		
12	016629	TEMPORARY CONSTRUCTION ROAD	M2	640		
13	074029	TEMPORARY SILT FENCE	M	5550		
14 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM	LUMP SUM	
15	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM	LUMP SUM	
16 (S)	120120	TYPE III BARRICADE	EA	26		
17 (S)	120149	TEMPORARY PAVEMENT MARKING (PAINT)	M2	46		
18 (S)	120165	CHANNELIZER (SURFACE MOUNTED)	EA	75		
19 (S)	129000	TEMPORARY RAILING (TYPE K)	M	3996		
20 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	95		

REVISED PER ADDENDUM NO. 5 DATED DECEMBER 21, 1999

ENGINEER'S ESTIMATE
04-013014

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
41	160101	CLEARING AND GRUBBING	LS	LUMP SUM	LUMP SUM	
42	016631	DEMOLISH MAINTENANCE FACILITY CONCRETE	LS	LUMP SUM	LUMP SUM	
43	016632	LEAD PAINT REMOVAL (MAINTENANCE FACILITY)	LS	LUMP SUM	LUMP SUM	
44	016633	ASBESTOS REMOVAL (MAINTENANCE FACILITY)	LS	LUMP SUM	LUMP SUM	
45	016634	ROADWAY EXCAVATION (HAZARDOUS)	M3	5930		
46	016635	ROADWAY EXCAVATION (CONTAMINATED)	M3	33 242		
47	016636	UTILITY EXCAVATION (HAZARDOUS)	M3	1685		
48	016637	UTILITY EXCAVATION (CONTAMINATED)	M3	40		
49 (F)	192003	STRUCTURE EXCAVATION (BRIDGE)	M3	4750		
50	BLANK					
51 (F)	048011	STRUCTURE EXCAVATION (TYPE A) (CLASS I)	M3	4290		
52 (F)	048012	STRUCTURE EXCAVATION (TYPE A) (CLASS II)	M3	7875		
53 (F)	192020	STRUCTURE EXCAVATION (TYPE D)	M3	345		
54 (F)	192035	STRUCTURE EXCAVATION (ROCK)	M3	15 300		
55 (F)	192037	STRUCTURE EXCAVATION (RETAINING WALL)	M3	675		
56	016638	STRUCTURE EXCAVATION (RETAINING WALL) (CLASS I)	M3	745		
57	016639	STRUCTURE EXCAVATION (RETAINING WALL) (CLASS II)	M3	1537		
58 (F)	192049	STRUCTURE EXCAVATION (SOLDIER PILE WALL)	M3	550		
59 (F)	192055	STRUCTURE EXCAVATION (SOIL NAIL WALL)	M3	340		
60 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	M3	6000		

ENGINEER'S ESTIMATE
04-013014

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
101	048022	STEEL SOLDIER PILE (W690 X 289)	M	355		
102	490574	FURNISH STEEL PIPE PILING (NPS 16)	M	5740		
103 (S)	490575	DRIVE STEEL PIPE PILE (NPS 16)	EA	160		
104 (S)	048023	3000 MM PERMANENT STEEL SHELL	M	502		
105 (S)	048024	3000 MM CAST-IN-DRILLED-HOLE CONCRETE PILING	M	1001		
106 (S)	048025	2700 MM CAST-IN-DRILLED-HOLE CONCRETE PILING(ROCK SOCKET)	M	721		
107 (S)	048026	INSTALL STATE-FURNISHED 3000 MM PERMANENT STEEL SHELL	M	499		
108	048027	FURNISH CAST-IN-STEEL SHELL CONCRETE PILING (NPS 30) (TYPE A)	M	12 565		
109 (S)	048028	DRIVE CAST-IN-STEEL SHELL CONCRETE PILE (NPS 30) (TYPE A)	EA	380		
110	048029	FURNISH CAST-IN-STEEL SHELL CONCRETE PILING (NPS 30) (TYPE B)	M	1760		
111 (S)	048030	DRIVE CAST-IN-STEEL SHELL CONCRETE PILE (NPS 30) (TYPE B)	EA	50		
112	048031	FURNISH CAST-IN-STEEL SHELL CONCRETE PILING (NPS 30) (TYPE C)	M	1300		
113 (S)	048032	DRIVE CAST-IN-STEEL SHELL CONCRETE PILE (NPS 30) (TYPE C)	EA	32		
114	048033	FURNISH CAST-IN-STEEL SHELL CONCRETE PILING (NPS 60)	M	210		
115 (S)	048034	DRIVE CAST-IN-STEEL SHELL CONCRETE PILE (NPS 60)	EA	5		
116 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM	LUMP SUM	
117 (S)	048035	TOWER FOOTING FORM	EA	2		
118	510000	SEAL COURSE CONCRETE	M3	1332		
119 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	M3	18 400		
120 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	M3	27 480		